THE

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WATER SUPPLY, & SANITARY IMPROVEMENT.

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GAS PURIFICATION
BY
OXIDE OF IRON.

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See Advertisement in last week's JOURNAL, page 426.

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ESTABLISHED 1840.

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GEORGE GLOVER AND CO.,
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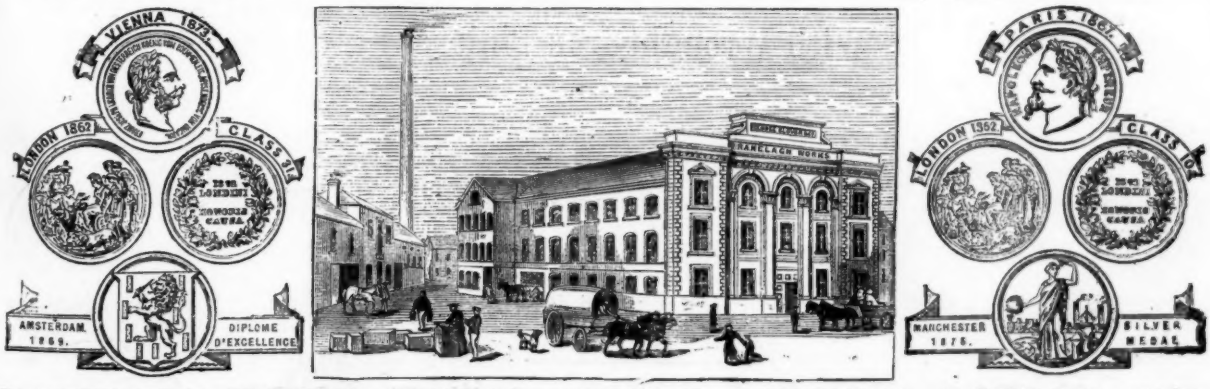

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EFFECTUALLY PREVENTS AND ARRESTS CORROSION.
HAS A FINE GLOSS, AND IS VERY DURABLE.
DOES NOT REQUIRE DRIERS LIKE OTHER PAINTS.
PROTECTS IRON FROM ACTION OF WATER.

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FORMS A VERY HARD TOUGH (NOT BRITTLE) SURFACE.
WILL NOT CRACK, BLISTER, OR SCALE.
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COVERS NEARLY DOUBLE THE AREA OF OTHER PAINTS. (7 gallons or 1 cwt. will cover 1211 square yards of Ironwork.)
IS CHEAPER AND MORE ECONOMICAL THAN ANY OTHER.

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IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

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IMPROVED DRY GAS-METERS;

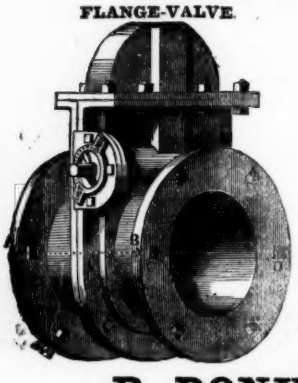
STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

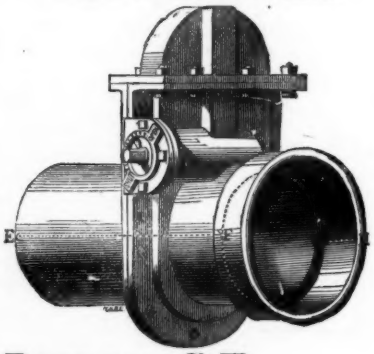
IMPROVED GAS-VALVES

FLANGE-VALVE.



With Wrought-Iron Pinions.

SPIGOT AND SOCKET-VALVE.



List of Prices, with dimensions of all Sizes up to 48 inches, to be had on application.

These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.

In ordering, please state whether required for under or above ground, and if to be with flanges or spigots and sockets cast on, or with separate spigot and socket-pieces.

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Also Makers of Steam-Engines, Beale's Exhausters, Water-Valves, &c.

HYDRATED PURIFYING MATERIAL.

Samples on application.

MESSRS. SPENCE BROS., LIMITED,

Will be glad to supply the above on the most favourable terms, and to treat, by Purchase or Exchange, for Spent Oxide.

PRICES ON APPLICATION.

ALSO PATENT DRY COPPERAS FOR EXTRACTING AMMONIA.

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IMPROVED HYDRAULIC CRANES,

Effecting a great saving in the cost of discharging Coals from Vessels, Barges, &c. Several of these Cranes, with the necessary power, are now being erected at Beckton, Hull, and other Gas-Works.

HYDRAULIC APPARATUS for Lifting and Lowering Purifier-Covers.

Sixteen recently erected at Beckton, applied to Covers 30 feet square.

SULPHATE OF AMMONIA APPARATUS,

IN SUCCESSFUL OPERATION AT THE NEW WORKS OF THE NEWCASTLE AND GATESHEAD GAS COMPANY, AND IN COURSE OF ERECTION AT THE CARLISLE CORPORATION GAS-WORKS.

Special "REGULUS COCKS" manufactured to stand Acid.

FOR PARTICULARS, APPLY TO

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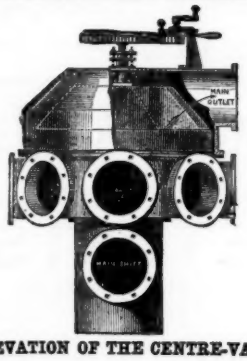
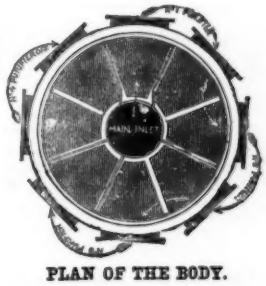
C. & W. WALKERS'
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.

PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS. DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

WILLEY & COMPANY,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

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NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

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They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

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GAS PURIFICATION

BY

OXIDE OF IRON.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

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MESSRS. NEWTON, CHAMBERS, & CO.,

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MANUFACTURERS OF

IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

WEST'S GAS IMPROVEMENT COMPANY,

LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

EDWARD COCKEY & SONS,

GAS ENGINEERS, FROME SELWOOD,

MANUFACTURERS OF ALL DESCRIPTIONS OF

APPARATUS CONNECTED WITH GAS-WORKS.

THE ORIGINAL PATENTEES AND MANUFACTURERS OF THE

DRY-FACED VALVES

FOR PURIFIERS, GASHOLDERS, BYE-PASS, AND OTHER ARRANGEMENTS REQUIRING VALVES IN GAS-WORKS.

The Faced Valves, as made by the Patentees, continue to give great satisfaction, and they are being used extensively by many of the best gas engineers of the day.

They are more easily repaired than any other kind of Valve in use, and can be re-ground in a few hours without removal, and made perfectly gas-tight.

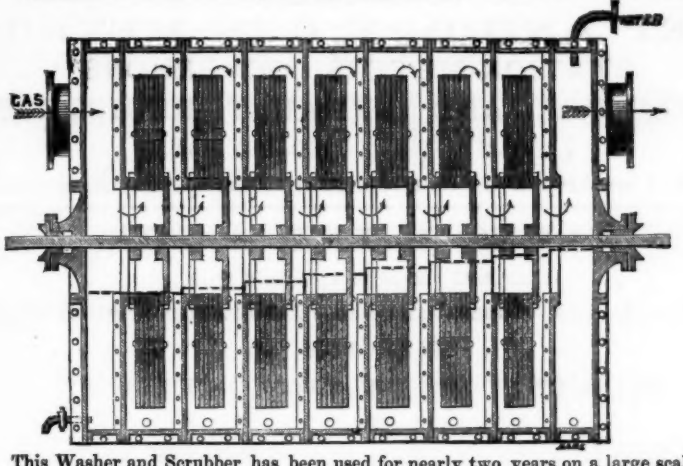
References can be given to many Engineers of high standing, who will testify as to the favour in which they are held.

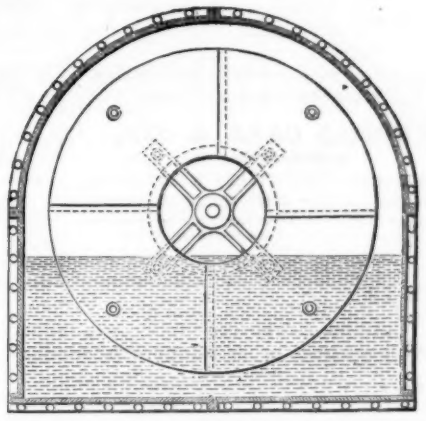
MANUFACTURERS ALSO OF SUPERIOR WOOD GRIDS FOR PURIFIERS, SCRUBBERS, &c.

THE

"STANDARD" WASHER & SCRUBBER.

[KIRKHAM, HULETT, AND CHANDLER'S PATENT.]





This Washer and Scrubber has been used for nearly two years on a large scale at the Works of The Gaslight and Coke Company, Bromley-by-Bow, at which station there are now several in operation and in course of construction. There is also one in use at the Pancras Station, King's Cross, of the same Company, which is purifying 1,500,000 cubic feet of gas per day. At the Gas-Works of the Corporation of Leeds, a large one has been erected, which is giving complete satisfaction. The Special Merits of this Washer are as follows:—

That it is a very effective Condenser, so that it is not absolutely necessary to reduce the temperature of the gas to 60°, or thereabouts, to make the Washer effective. That the distribution of the liquor is made with unerring regularity. That it occupies very small space, so that it can be, at little expense, effectually protected from extreme changes of the weather. That the considerable expense of Coke or Wood, or other Scrubbing Material, is entirely saved, and that the great nuisance and cost of from time to time replacing the Scrubbing Material is avoided. That, by the revolution of the discs, the quantity of water carried up by them, and tending continuously to fall, exposes a very large amount of fresh wetted surface to contact with the gas. That it is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured. That it is much cheaper than any other Scrubber that will do the same amount of work effectually. That it is the only Washer suitable for purifying Gas from all its impurities by solution. That it works with a minimum of pressure. That it takes out every trace of Ammonia from the Gas in once traversing the machine. That it requires very little outlay for foundations.

The following Testimonials show the opinion of eminent Engineers as to the capabilities of the Washer:—

D. HULETT, Esq. *The Gaslight and Coke Company, Bromley-by-Bow, May 3, 1877.*

Dear Sir,—In answer to your inquiries respecting the results of the working of your Patent Washer, I beg to state that I find it a very efficient machine. I have had it in operation for some time, and passed gas through it continuously at the rate of 100,000 cubic feet per hour, and obtained from it 11 gallons of 10 oz. liquor per ton of coal carbonized—results which appear to me very satisfactory for so small a Washer. It works very smoothly, taking but little power, and giving no pressure. I have it still in operation, and am perfectly satisfied with its working.

I am, dear Sir, yours truly, (Signed) W. B. WRIGHT.

MESSRS. KIRKHAM, HULETT, and CHANDLER. *The Leeds Corporation Gas-Works, York Street, Leeds, Dec. 6, 1878.*

Gentlemen,—The Scrubber-Washer erected by you at these works, and which has been in use for six months, has proved to be, so far as we have been able to test it, thoroughly efficient. We are at present making 32,000 feet of gas per hour, and are entirely dependent on this apparatus for the removal of Ammonia, and the **Gas is perfectly free from that impurity in the sixth chamber**, so that four chambers remain to deal with an increasing make of gas. Owing to insufficient condensers, the gas was in the summer admitted to the Scrubber at a temperature of 70°, but was reduced therein to 61°, or that of the atmosphere. The volutes are driven at the rate of four revolutions per minute, and, working at that speed, there is not the slightest difference between the inlet and the outlet pressure. Clean water supplied at the rate of 10 gallons per ton of coal carbonized is converted into liquor of from 10 oz. to 13 oz. strength **in once traversing the vessel.** The apparatus is extremely simple and compact, occupies but little space, and requires no foundation. I shall be surprised if it does not eventually become extremely popular.

I am, Gentlemen, yours faithfully, (Signed) HENRY WOODALL, Engineer.

MESSRS. KIRKHAM, HULETT, and CHANDLER. *The Gaslight and Coke Company, York Road, King's Cross, Jan. 14, 1879.*

Gentlemen,—In reply to your inquiry, I am pleased to say, the Washer which was put in action at this station in October last has quite fulfilled my expectations, as it confirms the experiments I made in May last with the smaller machine. Working at four revolutions per minute, **it takes out every particle of Ammonia,** while purifying more Gas than it was intended to do. I enclose particulars of a fortnight's working during our heaviest make, by which you will see that it yields the full quantity and strength of liquor, and works with little pressure. I am therefore quite satisfied with the machine, and trust it may meet with the success it deserves.—I remain, &c. (Signed) JOHN CLARK.

The following Table shows the results of the working of one of these Washers, lately erected to purify 60,000 feet of Gas per Hour, at the St. Pancras Station of The Gaslight and Coke Company:—

1879.	Nos. of the Divisions and Strength of Liquor in each.										Water used per Ton of Coals.	Gas Purified per Hour, Cubic Feet.	Ammonia on Outlet.	Temperature.			Pressures.		Revolutions per Minute.
	1	2	3	4	5	6	7	8	9	10				Inlet.	Outlet.	Atmosphere.	Inlet, Inches.	Outlet, Inches.	
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.									
January 1	8½	6¾	5	3½	2½	1½	¾	¼	0	0	10 Gallons.	52,000	Nil.	77°	73°	48°	24	23	7½
,, 2	8¾	7	6	4¼	3¼	2¼	1¼	½	¼	0	10 ,,	57,000	Nil.	73°	66°	32°	21¾	20½	4
,, 3	9¼	8	6	3¾	3	2¼	1¼	½	¼	0	10 ,,	60,000	Nil.	75°	68°	40°	23½	22	4
,, 4	9¼	7¾	6¼	4¼	3¼	2¼	1¼	½	¼	0	10 ,,	65,000	Nil.	74°	68°	33°	24	22½	5
,, 5	9¼	7	6	4	3	2¼	1½	½	¼	0	10 ,,	34,000	Nil.	77°	68°	35°	14½	14	5
,, 6	9¼	7½	6½	4½	3	2¼	1½	1	¼	0	10 ,,	65,000	Nil.	72°	66°	27°	24	22½	4½
,, 7	11	9	7	5¼	3¾	3	1¾	1¼	¼	0	10 ,,	59,000	Nil.	74°	66°	31°	25	23½	5
,, 8	9¾	7½	6	4½	3	2	1	½	¼	0	10 ,,	75,000	Nil.	73°	61°	31°	28	26½	4½
,, 9	11	9	7	5	3¾	2½	1½	1	¼	0	10 ,,	82,000	Nil.	74°	67°	33°	27½	25½	5
,, 10	10¾	8½	6¾	5	3½	2¼	1½	1	¼	0	10 ,,	66,000	Nil.	76°	64°	28°	28½	27	5
,, 11	12½	10	7¾	5¾	4¼	3¼	1¾	1¼	½	0	10 ,,	61,000	Nil.	73°	64°	27°	26½	25½	5
,, 12	11	8¾	6¾	—	—	—	1¾	¾	¼	0	10 ,,	39,000	Nil.	74°	64°	27°	26½	25½	5
,, 13	13	10½	8¼	6	4¾	3½	2	1½	½	0	10 ,,	78,000	Nil.	73°	65°	42°	28	26	5

MESSRS. KIRKHAM, HULETT, and CHANDLER. *Corporation of Birmingham, Gas Department, Saltley Works, May 23, 1879.*

Gentlemen,—I beg to enclose you a copy of the results of the tests which, by the kind permission of the Engineer, Mr. Clark, I made on the 6th of March last, of the working of one of your "Standard" Washers and Scrubbers at the St. Pancras Station of The Gaslight and Coke Company, and I am of opinion that, for an apparatus occupying so small a space, they are exceedingly satisfactory.—Yours truly, HENRY HACK, Engineer.

Working Results obtained from KIRKHAM, HULETT, *and* CHANDLER'S *Patent "Standard" Washer and Scrubber at the St. Pancras Station of The Gaslight and Coke Company, London, March 6, 1879.*

Gas passing per Hour, Cubic Feet.	—	Impurities in Gas per 100 Cubic Feet.			Temperature.		Pressure in Inches.	Revolution of Apparatus per Minute.	—	No. of Divisions and Strength of Liquor.										Water Used during Experiment. Gallons.
		SH_2	CO_2.	Grains. NH_3.	Washer.	Air.				—	—	—	—	—	—	—	—	—	—	
64,000	Inlet	2·00	2·00	158·8	72	57	21	4½	Twaddel deg. at 60°	5·3	4·9	2·85	2·35	1·7	1·05	0·6	0·3	0·15	0·1	63
	Outlet	1·50	1·50	0·8	68	57	20		Acid, ounces.	11·0	8·4	6·3	4·5	2·7	1·7	1·3	0·7	0·3	—	

WASHER-SCRUBBERS OF THIS PATENT ARE IN COURSE OF CONSTRUCTION FOR BECKTON, BRADFORD, GREENWICH, WOOLWICH, AND SEVERAL OTHER GAS-WORKS.

For further particulars and testimonials, address

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER.

C. & W. WALKER'S
WOOD PURIFIER SIEVES,

Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,
DONNINGTON, NEAR NEWPORT, SHROPSHIRE.
FINSBURY CIRCUS, LONDON.

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,
COTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.
Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

ESTABLISHED IN 1860.

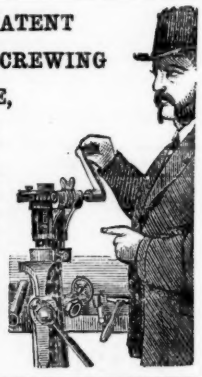
BENJAMIN CARPENTER,
THE ORIGINAL MANUFACTURER OF THE IMPROVED
WOOD SIEVES
FOR
GAS PURIFIERS & SCRUBBERS.

PROVIDENCE WORKS,
22, HERMES STREET, PENTONVILLE ROAD,
LONDON, N.

The Dunston Engine Works Co.,
GATESHEAD-UPON-TYNE.
Are the Sole Manufacturers of
Archer's Patent Hoists,
ALSO OF
Archer's Patent Stone Breaker,
AND OF
Archer's Patent Ore Crusher & Pulveriser,
The last-named Machine (without the Pulveriser) makes the best and most durable Coke Breaker.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,
Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1½ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

GRIRDROD'S PATENT
PORTABLE PIPE SCREWING
MACHINE,



For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.
In use at the chief gas-works, and giving great satisfaction.
For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.
W. H. BAILEY & CO.,
Brassfounders, Gauge Injector and Tool Makers,
ALBION WORKS, SALFORD,
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Gold Medal Awarded, Paris Exhibition, 1878.

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SHEAF AND SPRING WORKS,
SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
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STEEL OF ALL DESCRIPTIONS,
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WET AND DRY GAS-METERS,
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LAMP-METERS IN CAST-IRON BOXES,
And every Description of Gas Apparatus.

JAMES MILNE & SON,
GAS ENGINEERS,
Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
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2, KING EDWARD STREET,
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MARQUESS OF LONDONDERRY'S COLLIERIES.
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FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,
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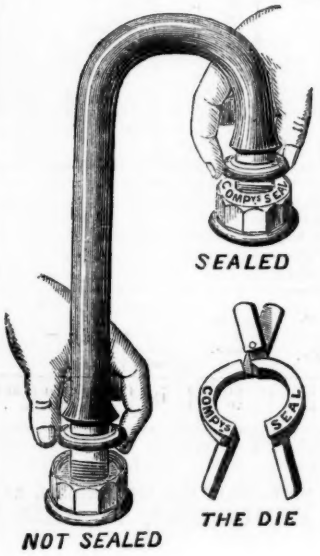
ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.
ESTIMATES GIVEN FOR MAIN-LAYING.
N.B.—All kinds of Fire Goods and Gas Apparatus supplied on the shortest notice.
Address:—J. & H. ROBUS, BELL GREEN, CATFORD, LONDON, S.E.

FOULGER'S PATENT
COUNTER-SUNK SEAL GAS-METER UNIONS,
As Supplied to The Gaslight and Coke Company.



These Unions practically place a Gas Company's property under lock and key, by rendering it impossible to disconnect at any joint at which gas could be obtained unregistered, without destroying the Company's seal or signature, whilst a small cover absolutely protects the impression from accidental injury.

A meter having been fixed with one of these Unions on the main-cock, and another on the inlet, a few pinches of specially prepared crushed sealing-wax is placed in the cup, and being melted with a blow-pipe, the wax runs between the reversed threads, the circular tong-shaped die will then give a sharp impression of the Gas Company's title, an operation requiring about two minutes in all to perform.

If heat is applied for the purpose of unsoldering the joints, the wax is instantly fused, and the impression, of course, lost.

Are supplied in all sizes, either as Caps and Linings or Barrel-Unions, and at a small additional cost over existing connections.

For further Particulars, Samples, &c., apply to the Sole Agents,

WIGGINS & RIHLL,
VICTORIA DOCK ROAD, LONDON, E.

TANGYE BROTHERS AND HOLMAN,

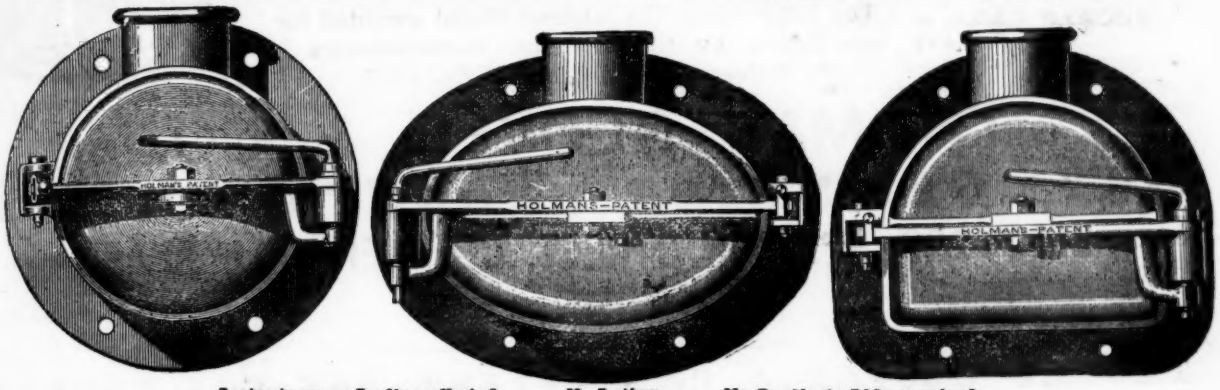
CORNWALL HOUSE, 35, QUEEN VICTORIA STREET, LONDON, E.C.,

(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

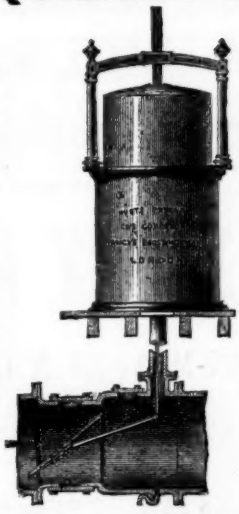
Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.



These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1878.

MESSRS. TANGYE BROTHERS AND HOLMAN.

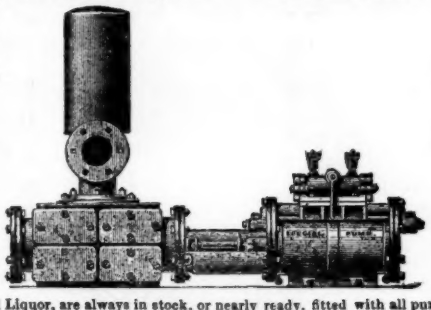
Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,
(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	21
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851. New York. 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

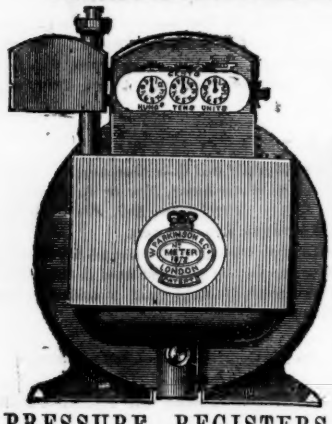
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS.

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816,)

MANUFACTURERS OF

WET & DRY METERS,

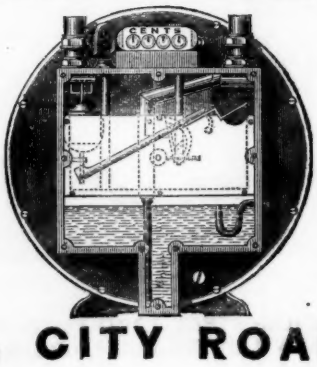
STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 23, 1879.

Circular to Gas Companies.

THE Corporation of Blackpool having obtained permission to expend £5000 in experimenting with the electric light, have lost no time in commencing operations. A correspondent of our own carefully watched the progress of the trials, and his account of them will be found in another column. The cost of the lights could not have been cheap. They were eight in number, and each one was produced by a Siemens dynamo-magnetic machine, the whole being actuated by two combined Robey engines of 32-horse power nominal, and a total of 36-horse power was indicated when all the machinery was in operation. The effect of this was, as our readers will see described by our correspondent, resplendent. Sight-seers from all the country round went to indulge their curiosity, and they have so far been well gratified. Not a few, perhaps, have gone home with the impression that the doom of Gas Companies is sealed, and that the electric light will supersede, eclipse, outshine, and eventually replace gas as an illuminating agent. This may be so, although the death of Gas Companies will be a very slow one. Experiments have also been made with the electric light at the St. Enoch's Station of the Glasgow and South-Western Railway. Four lights were used, and the machines employed were Gramme's. The effect here, too, is said to be remarkably good; the station being filled with a mild radiance resembling moonlight, which completely eclipsed the rows of gas-lamps that were burning at the same time. Here, again, gas is threatened with extinction—at all events, upon paper. The newspapers praise the electric light; and that being done, all who read the papers believe that the light is the illuminating agent of the future.

In London a new electric lamp has just been brought out. It is the invention of Mr. Heinrichs. The peculiarity in it appears to be the employment of semi-circular carbon poles, which are regulated by an arrangement which never allows them to touch one another. The light given by Mr. Heinrichs's lamp is afforded by a single-current dynamo machine. This lamp is only adapted for the illumination of large areas, so that the great problem of splitting up the electric current does not appear to have been yet completely solved, although Mr. Edison boasts of having made some strides towards success in this direction. It is reported that he has a plan by which he is able to produce eight electric light jets, as we may call them, each equal to sixteen candles, by the expenditure of less than one-horse power. The inventor adheres to the use of platinum spirals, and professes to have made some very important discoveries in connection with that metal. However this may be, even if the new lamp be taken as a realized fact, the competition between electricity and gas is little else than a dream; much more must be done before any real competition can take place.

The autumn meeting of the West of Scotland Association of Gas Managers was held last week at the Bridge of Allan. We are able to commence our report of the proceedings with the President's Inaugural Address, in which he points out to his brother managers how little is to be feared from competition with electricity. The West of Scotland, it is true, is a comparative paradise for gas producers, for there everything they require lies close to their feet, and gas is sent out of a quality such as we in the South know very little of. Still, we have no wish to see cannel gas re-introduced on a large scale into London. Mr. Mitchell noticed a patented process for obtaining gas from common coal dross. No doubt excellent gas may be obtained, and it will be perfectly easy to separate the products so as to get, in the first place, a gas of poor illuminating power, but a rich heating power; secondly, a gas of high illuminating power; and afterwards, as a matter of course, a gas of very little value at all to anybody. Now, all these products may just as well be mixed together at once, and distributed in the usual manner. Coal dross is now, no doubt, a cheap material; but if it be introduced into gas-making, it will soon find its value, and very little economy will be effected from its use. A very proper notice of the Greenock Exhibition, in which the West of Scotland gas managers are especially interested, was made by the President. This exhibition seems to have been very complete, and is certain to produce good fruits. We have so frequently referred to cooking and heating apparatus, that we may in this case pass at once to the engines intended to produce motive power; the only one displayed being the Bisschop engine, which deserves all the commendation that has been bestowed upon it. It is not a small matter that a gas-engine may be made to do duty in driving a number of sewing-machines, and even assist at the wash-tubs. For these purposes it must, of course, be made light. The heavy bearings which are at present in use with gas-engines always seem to us absurd. As we believe has already been stated in these columns, we shall never be satisfied with gas-engines till we find one which can be placed under a light vehicle, the greater part of the body of which can be filled with gas, and we can start on our business rounds, and get safely home again, with the genial assistance of gas. We know of no reason why Gas Companies might not be able to furnish such vehicles with the gas they would require. They have stations scattered all over London, and a cubic foot of gas, we may say, without making a bad pun, ought to go a long way. With Mr. Mitchell's recommendations to his brother Managers we perfectly agree; and, without conceit, may take credit for endeavouring to enforce them upon attention for a long time past. Having dealt with what may be called the end of gas, the President went back to the commencement, and began to question whether or not we had yet arrived at a perfect system of retorts and retort-settings. This is a matter which

eminently deserves the attention of gas managers; but, unfortunately, we have to wait a long time for results when changes of settings are made. We may here heartily congratulate Mr. Mitchell on having delivered an excellent, practical, and suggestive Address.

The Norwich Town Council seem fully disposed to push their opposition to the British Gas Company to extremities. They are anxious to ascertain as to how far any action they might take in actually supplying gas to the city would be fettered by the legal powers which the British Gas Company already possess. We think we may tell them in a very few words. As soon as they attempted to turn a stone in the street, an injunction would be applied for to restrain any further proceedings of the same sort. The monopoly of a statutory Gas Company in possession is complete, so long as certain conditions are fulfilled, and these conditions are perfectly satisfied by the present supply of the British Gas Company. It would be simply wasting the money of the Norwich ratepayers if any steps were taken to institute a competitive supply.

It ought to be perfectly well understood that only a Gas Company can supply gas to an independent shop or tenement. Any one who lets lodgings can, of course, make an agreement with his tenants which will allow them to take in their rooms a supply of gas which is passed through the landlord's meter; but if a next-door tenant, who has had his gas cut off, applies to his neighbour for a supply, and such supply is furnished, a decidedly illegal act is perpetrated on both sides. The decision in the case recently tried at the Southwark Police Court, and reported in another column, fully supports this conclusion, and, although only a small fine was inflicted, it will be sufficient to prevent further infractions of the law in the same direction.

The half-yearly meeting of the Bristol United Gas Company was held on Wednesday, the 17th inst., when, as a matter of course, full dividends, less income-tax, were declared. The large increase in the demand for gas has necessitated the earliest possible construction of new works at Stapleton. The contract for these was taken by Messrs. Aird and Sons, and the portion of the works for which a contract was made has been successfully completed. Mr. Giles, who was one of the speakers at the meeting, said he did not see anything in Mr. Kitt's attempt at improved public lighting in Victoria Street. Gaslight, as we have said before, may be better distributed, but any given amount of gas of fixed illuminating power cannot by any optical means be made to yield more light than the gas would give if consumed under ordinary circumstances. The secret lies in the burner, and the pressure at which the gas is consumed. Supposing the burner to be adapted for the consumption of the gas supplied at the proper pressure, no optical arrangements can possibly increase the amount of light produced.

Proposed Purchase of the Wellington (Salop) Water-Works by the Town Commissioners.—At a meeting of the Wellington Improvement Commissioners, last Wednesday, it was unanimously agreed "that the Commissioners make an offer to the Wellington Water-Works Company to purchase their undertaking at a sum to be fixed by arbitration, each party to pay their own costs of arbitration, and the Company be asked to reply to the offer as early as possible." The Commissioners were in favour of an Inspector being sent down from the Board of Trade to inquire into the matter and make an award.

The Proposed New Gas-Works at Newbury.—At a special meeting of the Newbury Town Council, held on Wednesday last—the Deputy-Mayor (Alderman Jackson) in the chair—the minutes of the Gas Committee were read, from which it appeared that, as recorded in the Journal for the 2nd inst., p. 370, a letter had been received from the Local Government Board stating that, in answer to the application made by the Council for authority to erect new gas-works on certain land specified, they were prepared to issue a Provisional Order to amend the Newbury Borough Extension Act, 1878, so as to enable the Corporation to manufacture gas and residual products on lands other than those mentioned in schedule B of that Act. Mr. J. G. O'Farrell (the Manager of the gas-works) was then instructed to prepare plans and specifications for the works on the new site. At a subsequent meeting of the Committee, Mr. O'Farrell's plans for the new works were considered, the cost of the proposed works being estimated by him at £6000, which amount included the purchase of the land. It was proposed by the Chairman, and seconded by Mr. Eatwell, that the Committee recommend that the proposed new works be erected on the land recently purchased by the Corporation, and the motion was carried. It was moved by Mr. Hall, and seconded by Mr. Eatwell, that the plans then produced by Mr. O'Farrell be approved, subject to their careful consideration by the Council, and the motion was carried. After some discussion, Mr. Money proposed that the consideration of the plans should be deferred till October, and that in the meantime they should be submitted to some independent engineer. Mr. O'Farrell said the plans had already been submitted to three London engineers. Mr. Hopson thought that if the Committee were satisfied with Mr. O'Farrell's plans and figures, it would be useless to go to the expense of calling in another engineer. Mr. Stone presumed that the report and recommendations of the Committee were based upon plans and figures as to which they had satisfied themselves, and he therefore moved their adoption. Mr. Eatwell seconded the motion. After a few remarks from other members, Mr. Money's proposal was put in the shape of an amendment, and carried.

Water and Sanitary Notes.

It must be confessed that the Metropolitan Water Companies have a very difficult part to play. During the past month everything has been against them so far as obtaining clear bright water was concerned. The Thames and the Lea were in flood during nearly the whole month, and enormous as the storeage reservoirs of the Water Companies are at this moment, they are still insufficient to afford subsidence for the vast bulk of water which London daily consumes. The consequence is that the filter-beds are overworked, and the water is delivered in a condition which does not satisfy the critical requirements of Dr. Frankland and Lieut.-Col. Bolton. This is a great pity, considering the enormous expense to which the Companies have gone, to satisfy the rather exacting wants of the Metropolitan public. It is pleasant to see, however, that, notwithstanding the condition of the water, Londoners continue remarkably healthy. This is so trite a saying that we hesitate to repeat it, although possibly too frequent mention of the fact cannot be made.

We are continually advocating in these columns a combination amongst the Water Companies, whereby much economy might result, and at the same time a greatly improved supply of water be given. The Water Companies have refused to avail themselves of the opportunities they have had of amalgamation; and now there is no use in blinking the fact that they stand face to face with the Government and the Vestries on a question which may be said to be life or death to them. We do not, of course, say that they are to be bought up at any price; but Mr. Cross has plainly told the Companies the terms he will consent to if the Government or an independent Commission effect the purchase. No such fancy price as was obtained at Middlesbrough will, it seems, be entertained. The works will be taken over at a certain date, at a fixed valuation on their profits at the time. The vestrymen are still hard at work on the Metropolitan Water Question, and a scheme has been prepared and sent to Mr. Cross, which, it is said, is fair and just to the present holders of water stock, and is intended to be satisfactory to the general body of consumers. On these points we can say nothing, because the scheme is not at present before us. We do not anticipate, however, that anything like confiscation will be attempted, and we know perfectly well that, if it were, no Government, Whig or Tory, would consent to it. The scheme correctly sets forth that great expenses have been incurred, and are likely to be incurred, in consequence of the treatment of the Metropolis in separate sections by independent Companies, each having to provide for works independently of all the others. This, as a matter of necessity, gives rise to large and unnecessary expenditure. One endeavour of the vestrymen is to reduce the extra expenditure, that a distinct economy in the management may be felt. Great reduction, we cannot say in the consumption, but in the distribution of water, must not be expected for years to come. The whole system of our distribution will require to be overhauled. People write of the quantity of water supplied to Liverpool and Manchester as though the present small supply were a thing of yesterday. The simple fact is, that to bring the consumption down to its present quantity has required years of exertion on the part of the Engineers of the Corporations concerned. We may admit the statement, which has, in fact, been over and over again referred to in these columns, that more than half the water pumped in London runs to waste; still it must be well understood that it would take ten years of hard work on the part of the Water Engineers to stop this waste.

The Corporation of Maidstone are always in trouble of some kind or another. It has been shown to them very clearly that their sewers admit spring water. There is nothing very strange in this, for we have known about six times as much subsoil water admitted into the sewers as the sewage they were intended to carry. The chemical treatment of sewage of this quality is, of course, out of the question; for irrigation purposes it may very well succeed, for any dirty water, and even pure water, serves for irrigation.

The Town Council of Canterbury have resolved on carrying out a system of sewerage and irrigation, on the merits of which we shall make no comment. There was very little division of opinion in the Town Council; but that, of course, goes for nothing. When Town Councils have made up their minds which way they will vote, no argument but one will influence their opinion. As regards Canterbury, it is a simple question, as it appears to us, whether or not a small gravitation scheme for flood water, and a larger scheme with sewage from a higher level, shall be adopted. The majority of the Council shrank from the expenses of the latter.

THE GOVERNMENT AND THE METROPOLITAN WATER COMPANIES.

It is very desirable that the questions at issue between the public and the Metropolitan Water Companies should be fairly stated and fully understood at the present moment, when the Government stands committed to move in the matter, and another session can hardly pass without some definite measure being proposed and discussed, if not actually carried through Parliament.

Putting aside personal feelings and private interests, which are, beyond doubt, exceedingly powerful, but ought not to have weight, it will be well to point out certain facts often lost sight of in the confusion of complaints and accusations on one side, and defence on the other, but which lie at the root of all discussion on the matter, and without duly considering which no satisfactory conclusion can be drawn.

Water supply should be obtainable in every house within the Metropolitan limits; it should be obtainable whenever wanted; in sufficient quantity for all reasonable purposes; at a reasonable price; and it should always be of a quality such that the use of it for drinking purposes should, under no conditions of weather or circumstances, become injurious to health. This statement of requirements may seem very simple, and so inevitable as to render it almost a platitude. It is, however, a fact that in the Metropolis, as now supplied, water is *not* obtainable in every house, it is *not* always in sufficient quantity, and the quality is often such as to render it unfit for drinking purposes. Where lies the fault? If the Companies are to blame, it is reasonable to ask the Government to interfere, and whatever may be the forces and interests in opposition, some effectual interference is ultimately inevitable.

Let us consider the requirements and the fulfilments more nearly. Why does not every separate tenement have a distinct supply? It is now recognized as a duty of the Government to superintend the construction of buildings, and see to their stability. Is it the fault of the Building Act, or those who put it in force, if recently-built houses, however poor, have no secured water supply? It is clearly not the fault of the Companies, who cannot insist on water-fittings being a part of the structure of a house. They might fairly insist on the fittings being such as should involve no waste, but more than this is impossible. We need not occupy time in pointing out how imperfectly the houses of many poor districts are adapted to receive any water supply at all, to say nothing at present about quantity and quality.

If modern houses are badly supplied, what shall we say for the older neighbourhoods? A short but brisk fighting for water during the time a stand-pipe is available has been the supply for whole courts and groups of houses. In the intervals of this kind of supply, nothing.

Whose fault is this? Surely, Local Boards and other modern Sanitary Authorities have here some duties to perform, and might have powers entrusted to them. Even where there are cisterns, there is at present no authority by which their dimensions can be ensured to have relation to the requirements of the inhabitants.

Next we come to the inquiry as to quantity. Unfortunately, when water was first supplied to London as part of our house arrangements, such a thing as constant supply did not exist. To fill a cistern at proper intervals was all the Companies could be expected to do. The construction of a cistern or the placing of a tub was left to the householder or the tenant. If he chose to have a large cistern, well and good; but if the cistern was originally small and insufficient, who was to blame? The Companies do not build cisterns for their customers, nor do they select tubs. They never have been, and never could be entrusted with such duties. They engage to fill cisterns; and, to prevent waste, they require ball-cocks to be fitted. If cisterns are too small or leaky, or if the ball-cock is in bad condition, it is no fault of the Company that the daily supply is insufficient. How often the fittings are leaky and bad, those only know whose duty it is to attend to the complaints of customers.*

There is, no doubt, one sure remedy for inadequate supply, and that is—constant supply. The mains can be always full, and the communication with the main direct. But to carry out this great change in the system, a certain cost is inevitable. All the fittings must be altered, and this at considerable expense. Who is to meet this expense? It is clear that the Companies have no right to do it, except at the request of the house-owner, and in all the worst cases the house-owner will not or cannot find the money to make the change.

* In a case recently brought under our notice, a signed complaint from 35 householders was sent through a Vestry to a Company. On inspection, *all* the cisterns of the complaining parties were leaky, and *all* the fittings out of order.

Here, however, the action of Government becomes possible, and we believe it to be desirable. Constant supply is already authorized, and the Companies are bound to give it, if desired. They do not object to do so, for constant supply under proper inspection is well known to be far more economical than intermittent supply. When people use as much water as they like, but are not allowed to waste it, they do not, in a general way, require more than 16 or 18 gallons per head per day. In London, the consumption and waste under the present system require nearly double that quantity to be daily pumped up and delivered. Between sixty and seventy million gallons of water are every day wasted in this huge Metropolis of ours. The actual cost of delivery, in labour and wear and tear of material and plant, may be fairly estimated at £1000. The inhabitants of London throw away more than a quarter of a million of money a year because the Companies cannot insist on constant supply, because the house-owners will not, as a body, pay for it, because the Parochial Authorities and various Boards have no power to interfere, and because Parliament has not yet authorized any such obligation on house-owners.

The fact is that the bugbear of inspection and interference, and the dread of a monetary outlay, has completely prostrated every effort at improvement. Nobody dares come forward to suggest an unpopular measure. Will the Home Secretary brave this difficulty, and cut the Gordian knot? It is easy to blame the Companies, but what would be done in this matter by any Central Authority if Government were to buy the Companies up?

To effect the radical change of introducing constant service as an obligatory measure, and enforce its observance, would require some management and much money. The management, however difficult, is not impossible; and we have the experience of many towns in proof of this. These examples also afford examples of the means. The money question is, perhaps, more difficult; but it ought not to be insuperable. The Companies might be authorized to borrow the required sum, complete the works themselves, and be repaid by a separate landlord's tax, quite independent of water-rent, lasting for a limited period, and redeemable at any time by a single payment. The obligation of keeping the fittings in order might fairly fall on the Companies, except in cases of mismanagement by the occupier.

With a constant supply, the question of quantity would be at an end, and all questions of quality dependent on imperfect fittings and foul cisterns would be at an end also. Large consumers would pay by meter, and the meter system might be introduced as thoroughly as in the consumption of gas, the Companies supplying and charging for the meter. The landlord's tax would soon be paid by a saving in consumption if meters were used; and in this case the rate should be paid out of the water-rent.

Lastly, there is the question of quality. This, however, requires more space for its discussion than we have at present at command. We will resume its consideration next week, and endeavour to point to some practical conclusions.

A New Gas Managers Association in the United States.—A meeting of gas engineers was held on July 8th, at the office of Mr. F. C. Sherman, Engineer of the New Haven Gaslight Company. The meeting resulted in the formation of the "Connecticut Gas Engineers Association"—John P. Harlin, President; F. C. Sherman, Vice-President; Charles H. Nettleton, Secretary and Treasurer. The meetings are to be held quarterly, on the third Wednesdays of March, June, September, and December.

Death of Mr. Thomas Pocock.—The death is announced, on the 15th inst., of Mr. Thomas Pocock, aged 89. Mr. Pocock was for a great number of years Chairman of the Surrey Consumers Gas Company. He took the chair for the last time at the half-yearly meeting of the Company on April 7, 1873, though his resignation of his position, owing to advanced age, was not announced till the meeting of Shareholders on the 4th of October, 1875.

Death of Mr. E. J. Southwell.—We regret to announce the somewhat sudden death of Mr. Edward Joseph Southwell, the Secretary of the Commercial Gas Company, to which post he was elected on the death of Mr. Jaques, in April, 1876. For a long time Mr. Southwell occupied a prominent position in connection with the parochial affairs of Mile End Old Town. For about 20 years he filled the office of Clerk to the Board of Guardians of that district, and was also Vestry Clerk and Superintendent Registrar for Mile End. On his resigning these offices for the position he occupied till his death, he was appointed by the Local Government Board a Nominee Guardian for Mile End, and has assisted very materially by his knowledge and large experience of parochial business. His death occurred last Wednesday. He was in his 60th year.

Lancaster Corporation Water-Works.—From the accounts of the Lancaster Corporation, from Sept. 29, 1877, to March 25 last, which have just been issued, it appears that the balance transferred from the water-works revenue account to the general district fund was £1242 3s. The water-works extension account includes: Salaries of clerk of works, two sub-inspectors and workmen's wages, £436 2s. 3d.; commission to Mr. Mansergh, £800; surveyors fees, £18 1s. 2d.; town clerk's bill for parliamentary proceedings, £1008 18s. 11d.; on account of contract, £7010, and other items. Mortgage bonds of the Corporation had been discharged to the amount of £5066; and the mortgage debt is now £61,684. Of this sum, £28,634 is the water-works and sewerage debt, £23,400 for water extension, and £9650 for street improvement.

THE NEW PETROLEUM ACT.

After "shoddy" came petroleum. Of all sources of wealth, to "strike ile" proved for a time the most redundant. Inherently a better and honester thing than "shoddy," and all that the term signified, petroleum became at last a good thing very much overdone. Still, it exists, and meets a demand which is itself enormous, though the supply is ever ready to exceed it. Petroleum is to villages and isolated houses what gas is to towns and cities. As a cheap illuminant, it has conferred an immense boon upon the poor, superseding the miserable "dips" which formerly glimmered in the cottages and homes of the working classes. But this otherwise beneficent agent has not been free from fault. Petroleum might almost be called a Protean oil. It appears in many forms, or, as we might say, in many stages of existence, each gradation being marked by a different degree of volatility. When the present illuminating gas was first introduced, the public accepted it with fear and dread, owing to an exaggerated and erroneous idea of its explosive character. Petroleum is not, strictly speaking, an explosive oil, any more than illuminating gas is of itself explosive. But, in common with a large class of mineral oils, it is capable of emitting a highly inflammable vapour, the ignition of which may lead to very serious disaster. The vapour emanating from an oil of this description gave rise to the "blue burs-"ticle," as the bargeman termed it, which fired the gunpowder on board the *Tilbury* in the Regent's Canal. Accidents of lesser note are continually occurring from the same cause. Even the ignition of the oil when a lamp is upset is probably due, in a very great measure, to the vapour which is then poured forth. The volatile nature of petroleum has been made the foundation of many projects for either superseding or improving the present gas manufacture, but none of these schemes have been found practically useful, except on a very limited scale. That petroleum may be used as a fuel in the generation of steam is daily demonstrated—as, for instance, on the Caspian. Some years ago experiments were made in Woolwich Dockyard, in order to discover whether oil of the nature of petroleum could be used advantageously as a source of heat for raising steam. The results appear to have been satisfactory, except that the fire was apt to be a little too lively. Three times did the Government engineer have his hair and whiskers singed. He "got used to it," but the Admiralty seem to have entertained the idea that such accidents might be dangerous on board ship. A solid mass in a state of incandescence, like burning coal, was comparatively manageable. But a blazing liquid might travel no one knew whither, and to have a fiery fluid running about a ship, diving down into every chink and cranny, was more than British valour could be expected to cope with. Hence our ironclads continue to be furnished with coal. The burning of the *Goliath* may perhaps be accepted as an approving comment on the discreetness of the Admiralty. The question of cost also has to be considered. At the time of the Admiralty experiments, now thirteen years ago, the price of petroleum was too high to admit of a favourable comparison with coal, despite the great evaporative power of the oil.

The readiness with which petroleum and its congeners give off their ignitable vapour has naturally led to the setting up of a standard representing the temperature at which such vapour is evolved. A line has been drawn, which is supposed to separate the dangerous oils from those which are comparatively safe. The Petroleum Acts of 1862, 1868, and 1871, fixed the standard at 100° Fahrenheit. But it was well known, at the time that the last of these Acts was passed, that very much depended on the manner in which the oil was tested. It was to the interest of the importer and others to make the oil endure the test successfully, and for that purpose to have the operation performed in such a way as to give the oil the best possible chance of escaping the law. On the other hand, the safety of the public demanded that the test should be rigorously applied, so that if the oil were really capable of giving off an inflammable vapour at a less temperature than 100°, the fact should be known. When the Act of 1871 was passed, it was found impossible to come to a decision as to the best mode of testing petroleum; and there was an especial difficulty in deciding what should be the temperature, for it was apparent that, if a new mode of testing were introduced, some change in the standard would be necessary. Unable at the time to grapple with this part of the subject, the Legislature passed an Act totally repealing the two previous statutes relating to petroleum, and substituting other provisions; but leaving the standard and mode of testing unaltered. With a view to speedy amendment in this particular, the new Act was declared to be operative only for one year. In 1872, the question was consequently revived, and a Select Committee of the House of Lords endeavoured to give the matter a final settlement. The essence of the controversy had reference to what is termed the "flashing "point" of the oil. The oil to be tested was warmed in an open vessel, and a light was applied at intervals to ascertain whether any inflammable vapour was being given off. A thermometer, with its bulb immersed in the liquid, indicated the temperature, and this was made to rise until the vapour flashed in the presence of the light. With this apparatus different operators, animated by opposing interests, obtained conflicting results. Even where an honest intention existed, on either side, to get at the truth, there was a lack of uniformity in the temperature recorded. This mode of testing was called the "open test." Another method was proposed, called the "close test," which it was considered would be free from the defects of the existing plan. The witnesses examined before the Committee were by no means agreed, either in their conclusions or their data, though the majority were of opinion that the close test was decidedly more reliable in itself, and much less open to manipulation than the open test. The standard temperature to be adopted was the subject of a hard fight, and the issue of the contest in 1872 was simply to leave things as they were, the Act of 1871 being kept alive by its inclusion in the Expiring Laws Continuance Act, a method adopted session after session until the present year.

In 1875, the Home Secretary requested Mr. Abel, the Chemist of the War Department, to conduct an investigation into the matter of the petroleum test. Mr. Abel accordingly placed himself in communication with Mr. Keates, Dr. Letheby, Dr. J. Attfield, Mr. Dugald Campbell, Dr. B. H. Paul, the Secretary of the Petroleum Association, the Secretary of the Scottish Mineral Oil Association, and the Local Authorities of Liverpool and Bristol. Mr. Keates had both advocated the close test, and had devised an apparatus for applying it. As the Consulting Chemist to the Metropolitan Board of Works, and long familiar with the petroleum question, he was a leading witness before the Select Committee in 1872. Writing to Mr. Abel in 1875, Mr. Keates expressed his belief that the close test was not objected to *per se*, but that great difference of opinion existed as to the proper change to be made in the standard of temperature. In regard to the point at which this standard should be fixed, there was a wide difference between Mr. Keates and Dr. Letheby. The Committee of the Petroleum Association stated an objection to the close test which had a very plausible air about it. They suggested that to lower the standard of temperature, as would be required for the purposes of the close test, would probably lead to some misapprehension among the generality of people. We find the Committee arguing that the public, having been "educated "in the belief that anything over 100° Fahr. means safety, "and below 100° danger, might associate any lowering of the "standard with increased risk to themselves, even if such "lower standard were explained to be equivalent to an equally "stringent and more certain test."

Having thus taken pains to discover whether the principal witnesses who gave evidence in 1872 had gained any fresh light by experience, Mr. Abel carefully reviewed all that was said, and entered on a series of experiments. After this he drew up a very admirable report, which was laid before the Home Secretary in the autumn of 1876. In that report, the old standard of 100° Fahr. by the open test was accepted as sufficient for the protection of the public, supposing it could be correctly ascertained; but Mr. Abel declared the mode of testing prescribed by the Act of 1871 was not of a nature uniformly to ensure reliable and satisfactory results. To remedy this state of things, he proposed the use of a new apparatus, founded on the principle of the close test, the flashing point being fixed at 73°, this being apparently equivalent to 100° by the open test. With a very creditable degree of modesty, Mr. Abel observed that, although his conclusions with regard to the relations between the old and the new flashing point were based upon the results of a number of carefully-conducted experiments, it appeared desirable that the minimum flashing point to be adopted with the new test should be deduced from the results of a much larger number of experiments, to be conducted by "several independent operators of acknowledged experience "in the testing of petroleum." For this purpose he made mention of Mr. Keates, and the Secretaries of the two Associations. This recommendation, we presume, has been carried out. At length, in the session of the present year, the question which has so long been kept in abeyance has received its settlement. A new Petroleum Act has been passed, which substitutes for the open test that which has been proposed by Mr.

Abel—namely, the close test, as improved by that gentleman. The standard is fixed at the point proposed in Mr. Abel's report to the Home Secretary. Subject to this change of test, the Act of 1871 is made to continue in force until otherwise directed by Parliament. The new Act is declared to come into operation on the last day of this year, from which period, therefore, the new system will be adopted. The mode of testing is set forth in the first schedule of the Act, which includes a specification of the apparatus. A very excellent arrangement embodied in the Act is that of having a pattern apparatus deposited with the Board of Trade. This pattern is called a "model"—a term which hardly conveys the correct idea, seeing that it is a model on the full scale, and is really what we should call a sealed pattern. With this pattern, or full-sized model, every apparatus designed for the legal testing of petroleum must be compared and verified, and, if found correct, such apparatus will be stamped as evidence of its conformity with the requirements of the law.

As all the parties concerned appear to have consented to the change thus brought about, we may trust that the new law will work smoothly and satisfactorily. Although the apparatus for effecting the close test is based very much on the plan devised by Mr. Keates, distinct praise is due to Mr. Abel for the manner in which he has perfected the appliance, especially in the management of the flame by which the vapour is ignited. A very pretty little mechanical arrangement renders this part of the operation really automatic. The temperature of the oil is raised by means of a bath of hot water, surrounding the vessel in which the oil is contained. The oil vessel or cup has a close-fitting lid with apertures, these apertures being themselves covered by a slide. When this slide is withdrawn, the test-flame approaches the apertures, and if there is any appreciable collection of vapour, this is manifested by a flash, and the temperature of the oil at that moment represents the flashing point. There are various precautionary devices connected with the apparatus, and altogether a great amount of skill has obviously been exercised upon it. Thus we may hope that under the new system there will be none of those disputes as to the actual flashing point which have so often occurred under the old. It is curious that it should have taken so many years to devise a system whereby the "flashing point" of an oil should be unmistakeably ascertained. The Americans, we may observe, make use of what is called the "fire test." They take no notice of the flashing of a vapour, unless the surface of the oil is permanently ignited. It has been stated, and we should think with truth, that this method of testing is subject to as many discrepancies as the open flashing test from which the English market is about to be delivered. In all probability the Americans will be wise enough to test their oil by the English method before sending it here, seeing that they can henceforth do so with practical certainty. To be able to anticipate the official verdict, must be of great advantage to all who are concerned in the oil trade. Hitherto there must have been doubt as to a degree or two—or something more—in the vicinity of the dividing line. Four years ago an English firm largely engaged in the oil trade wrote, saying: "We have on more than one occasion purchased "petroleum certified by the Petroleum Association as not "flashing at less than 100° Fahr., and yet when this oil "has been tested by one of our own *employés* who under-"stands the process, the flash has taken place at 94° or 95°, "being thus 5° or 6° below the standard."

The uncertainty which has thus so long existed will now be practically abolished, and large transactions will be thereby greatly facilitated. But the petroleum law is still a very peculiar enactment, and some doubts may be entertained as to the wisdom which actuates it. For the purposes of the Act, oil which stands the test is no oil at all. At all events, it is not "petroleum." Taking the new Act as it will shortly come into operation, we find that oil which does not give off an inflammable vapour at a temperature of less than 73° Fahr. is subject to no regulation whatever. For instance, if the thermometer has reached 73° when the vapour flashes, the law has no more to say on the subject. So far as the Petroleum Act is concerned, the oil may be treated as beer, or even as water itself. But if the vapour flashes when the thermometer stands at 72°, then the commodity comes under the sceptre of the law, and, being declared "petroleum to which "the Act applies," various regulations prescribed by the Act, and, under the Act, by the Local Authorities, forthwith take effect concerning it. Yet, who can undertake to say that an oil which flashes at 73° is "safe," while a similar kind of oil flashing at 72° is "dangerous"? For all practical purposes one is just as dangerous as the other. The oil which burned up the passenger train at Abergele was a coal oil, having a very high flashing point. "Petroleum," as declared by Act of Parliament, would have been no worse. If a thousand tons of actual American petroleum were stowed away in the most crowded part of London, the Petroleum Act would afford no protection against the peril thus created, if it could be shown that, by the open test, the oil did not flash at less temperature than 100°, or, by the close test, at less than 73°. The only way to get rid of the incipient volcano would then be by some legal procedure under another statute, perhaps not very easy to carry out. The safety of the public would seem to demand that oils of the kind specified in the Petroleum Act should be treated as petroleum, let them flash at what point they may. The existing law may be very useful for trade purposes, but we should really like to know, more clearly than we can apprehend at present, on what principle an oil which gives off an inflammable vapour at 73° Fahr. is allowed to escape regulation, as though it were a harmless and innocent liquid. The statute appears in this respect rather to legalize a danger than to provide against it.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

UNACCOUNTED-FOR GAS.

SIR,—In answer to the letter of your correspondent "Manager," in last JOURNAL, allow me to take up a little of your space in reply. He states that in the winter quarter the make is (in round numbers) 4 million cubic feet, and the percentage of unaccounted-for gas 8; but in the summer quarter, when the make is only 2 millions, the percentage rises to 20; or, in other words, when the make is one-half less, the percentage of unaccounted-for gas is (in round numbers) doubled.

I think there is no difficulty whatever in accounting for such a state of things, because *the percentage of gas* lost does not depend solely on the amount wasted by defective mains, deficiency of water in the meters, or condensation, but depends very much on the amount of gas made. Suppose, for the sake of illustration, that 100 feet was the make, and that by escapes, &c., 10 feet were lost—it would represent 10 per cent.; but if only 50 per cent. were made, and 10 feet were still lost, then it would represent a loss of 20 per cent.

Practically, the amount of gas lost will remain the same summer and winter (at least so far as bad joints are concerned), so long as the same pressure is kept up in the mains. So with the case under consideration, the make was 4 millions, with a loss of 8 per cent. in the winter quarter, and in the summer quarter the make was one-half less, and the loss (about double) 20 per cent. The same amount of gas lost for half the amount made must of necessity double the percentage lost. And if your correspondent can by any means reduce his unaccounted-for gas to 8 per cent. in the summer quarter, he will find, to his great delight, that in the winter quarter he will have a loss of only 4 instead of 8 per cent.

So far as condensation is concerned, as it is caused by cold and not by heat, it would tend rather to increase the winter more than the summer loss.

SCOTIA.

SIR,—With reference to the variation in the percentage of unaccounted-for gas in the winter and summer quarters, experienced by a "Manager," allow me to point out that though condensation (or the loss arising from the difference in the temperature at which gas is measured at the station-meter and at the consumers meters) will account for part of it, the greater part is to be found in the defective and leaky state of the mains, services, main-cocks, and lamp-taps, or some of them, through which the gas is leaking day by day in pretty nearly equal quantities. Now, if the quantity of gas lost in this manner be about the same in one quarter as another, it is evident that in the summer quarters it will bear a larger proportion to the smaller quantity of gas made than it will do to the heavier make in the winter quarters.

Supposing the *leakage* to be 400,000 feet per quarter, in the winter quarter, when the make is 4 millions, it will be 10 per cent., but in the summer months, when the make is 2 millions, it will be 20 per cent.

TOBIAS.

SIR,—In your issue of the 16th inst., "Manager" inquires why the percentage of gas unaccounted for is more in summer than in winter.

I imagine that the actual quantity of gas lost by leakage is the same, or nearly so, during the whole of the year. If 4 million cubic feet of gas were made during the winter quarters, and the loss occasioned by leakage were 320,000 cubic feet, or 8 per cent. of the total quantity made, acting upon the presumption that the leakage in the summer is the same as in the winter, the loss for the summer quarters would be 320,000 cubic feet also, although the quantity of gas made for that period was only 2 millions. This would at once increase the deficiency to 16 per cent., as it is clear that, although no more gas was actually lost, still, if only half the quantity was made, the deficiency compared with that quantity must necessarily double the percentage. The remaining 4 per cent. would undoubtedly be caused by condensation, owing to the gas being slower in passing through the pipes.

Sept. 20, 1879. C. T.

SIR,—Answering the question of "Manager," in your issue of the 16th inst., I would beg to draw his attention to the following facts and figures. The mileage of his mains being a constant figure in all seasons, it stands to reason that the *absolute* quantity of gas actually lost through leaks in mains, joints, and services, must, taking an equal pressure, be

about the same in all seasons, whether much or little gas is sent out from the gasholders.

Eight per cent. in the winter quarters, upon 4 million cubic feet of gas consumed, amounts to 320,000 cubic feet; 20 per cent. in the summer quarters, upon 2 million cubic feet, amounts to 400,000 cubic feet. The bulk of the unaccounted-for gas is therefore larger by 80,000 cubic feet during summer, as against the winter quarters.

It is a well-known fact that gas will expand at the rate of 0·00209 (of its bulk at 32° Fahr.) for every degree of temperature *above* 32° Fahr. If, therefore, the average temperature of the gas sent out in winter had been, for instance, 60° Fahr., and that in summer 70° Fahr., the 2 millions sent out in summer were in reality only 1,958,200 cubic feet, if reduced to the standard of the winter temperature.

The above made-out difference of 80,000 cubic feet between the unaccounted-for gas in summer and in winter will thus be reduced to only 38,200 cubic feet (not so wide a difference after all), and must be explained by local and accidental circumstances, such as loss of gas by main-laying, the making of connections and laying-on of services, repairs on the works, &c., all of which will more frequently occur during the summer than in the winter months.

The actual loss by condensation will in reality be much more than above shown, and the difference of 10° Fahr. was only chosen as an illustration.

CIVIS.

STEAM-BOILERS.

SIR,—I have a small steam-boiler (plain) which was put in about seven years since, and until last winter all was well with it; but since that time it has made a noise similar to small explosions, or a very loud thumping, more especially when the water is low, and about 15 lbs. steam pressure. When it is at about 25 lbs. or 30 lbs., and there is a higher water-line, it is not noticeable. It is fitted with a mud or blow-off pipe nearly to the bottom, is blown out every week, and there is scarcely ever any scale on the boiler.

Can any brother manager give me a reason for this peculiar noise?

A LOVER OF GAS-ENGINES.

THE USE OF AMMONIACAL LIQUOR FOR LIQUID MANURE.

SIR,—Will any of your readers give me particulars of the quantity and quality of ammoniacal liquor with the necessary quantity of water to form a suitable liquid manure for application to pasture land? Mr. Newbigging, in his work "The Gas Manager's Handbook," says: Ammoniacal liquor one part, water seven parts; but does not state the strength of the liquor in degrees Twaddel.

An early reply will be very much esteemed by

CARBON.

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

WEDNESDAY, SEPT. 17.

(*Before Justice* BOWEN, *Vacation Judge.*)

DAVIS *v.* ISLE OF THANET GASLIGHT AND COKE COMPANY.

This matter was again mentioned, but with no tangible result.

Mr. BAGSHAWE, for the plaintiff, said it was an action to restrain the defendants from breaking up the high road traversing the village of Westgate, Mr. Davis being the owner of the soil on each side, and consequently of the road itself. During the pendency of the motion, the defendants had gone through the plaintiff's land at Westgate, as they said, before any undertaking had been given or the notice of motion served, but as the plaintiff contended, in breach of the undertaking given when the matter was first mentioned. That question, of course, would have to be decided on a motion to commit, and he would not now go into it, except to say that he should require to cross-examine the defendants witnesses; but the plaintiff also stated in his last affidavit that the defendants intended continuing their operations westward through other lands of his at Birchington, and with regard to that he must ask his lordship to hear the motion.

Mr. CHAPMAN BARBER, who appeared for the Company, said they had never gone beyond the high road, and did not intend to do so, and under their Act of Parliament they had a right to do what they had done.

Mr. BAGSHAWE said he should contend that the defendants had no such authority under their Act. That would be partly a question of the construction of the Act, and partly a question of fact, as to whether the *locus in quo* was within their Act at all; the Act, which was an old one, applying to "Margate, Ramsgate, Broadstairs, and places adjacent," and this being a long way off either.

His LORDSHIP said the plaintiff could always disconnect the pipes if they were within his own soil.

Mr. BAGSHAWE said his client had done so.

Mr. BARBER retorted that the Company had been authorized by Justice Stephen to repair the pipes so broken.

Mr. BAGSHAWE said they were only authorized to plug up the pipes to prevent the escape of gas.

His LORDSHIP asked if it was admitted that the soil of the high road belonged to the plaintiff.

Mr. BARBER said no, he admitted nothing.

Mr. BAGSHAWE said he was willing for the motion to stand over on the understanding that matters should remain *in statu quo*, and that the pipes were carried no farther through any land of the plaintiff's.

His LORDSHIP said he did not suppose the defendants would agree to that, and he did not quite see why the balance of convenience was in favour of his granting the injunction.

Mr. BAGSHAWE said the object of the Company was to go to Birchington, where Mr. Davis owned gas-works for which he paid a large price, but the value of which would be destroyed by the Company going there. If the defendants were right, they had had power to supply Birchington with gas for the last 50 years, but had not done so.

Mr. BARBER said all this had recently been before a Committee of the House of Commons.

His LORDSHIP said he could not see that any injury would result from his refusing the injunction, or ordering the motion to stand over, because if the defendants turned out to be wrong, the pipes would have to be removed.

After some further discussion, the motion was ordered to stand over to the second motion day in November, the costs being reserved, and no undertaking given on either side.

SOUTHWARK POLICE COURT.—THURSDAY, SEPT. 18.

(*Before Mr.* PARTRIDGE.)

ILLEGAL CONSUMPTION OF GAS.

William Henry Earthrowl, of 47, King Street, Borough, and *Thomas Davis*, of 48, King Street, were summoned, the former for improperly using and burning the gas of the Phœnix Gas Company without their sanction; and the latter for unlawfully supplying Earthrowl with gas.

Mr. ALLEN, for the Company, said that these proceedings were taken under the 18th section of the Gas-Works Clauses Act, 1847, 10 Vict., cap. 15. The defendant Earthrowl had been a customer of the Company from Christmas last up to the 15th ult., when, owing the Company £4 19s. for the supply of gas, and neglecting to pay this sum, the supply was cut off from the premises, and it had not since been connected. The other defendant, who carried on business next door, had, however, without the sanction of the Company, supplied him with gas, which rendered both liable to heavy penalties under the Act.

Mr. *George Edward Bryant*, Chief Inspector in the Company's service, said he was aware of Earthrowl being a defaulter, and his gas being disconnected on the 15th ult. On Thursday, the 11th inst., as he was passing the shop at night time, he was surprised to see gas burning in the back premises, and on entering the shop he asked him how he obtained his supply. Earthrowl replied, "From Mr. Davis, next door." He (witness) then examined the premises, and found a hole through the party wall, and a pipe fixed to Davis's pipe near the meter. He told defendant he had acted wrongly, and would be summoned for it, when he said Davis did it. They did not think any harm was done, as Davis paid for the gas consumed.

Mr. PARTRIDGE asked defendants what excuse they could have for connecting the gas without the sanction of the Company. It was a very serious offence.

The *Defendant Davis* said he always paid for his gas, and gave the Company no trouble. His neighbour Earthrowl had his gas cut off, and as he was about to dispose of his business, he thought he could get a better price for it by having gas burning; therefore he (Davis) allowed him to connect a pipe to his supply-pipe, but it was after the gas had passed through his meter, so that the Company would not be defrauded of a single penny.

Mr. ALLEN reminded Davis that at the back of the card supplied by the Company was printed the section of the Act forbidding such connection without the consent of the Company.

Mr. PARTRIDGE examined one of the cards, and said he was of opinion that the words were so vague as to lead to some misapprehension on the part of consumers. The defendants had acted wrongly, but they might have been misled by the words on the card. He should fine each of them in the mitigated penalty of 20s. and costs. At the same time he recommended Mr. Allen to call the attention of the Company to the cards, and have them altered.

LAMBETH POLICE COURT.—FRIDAY, SEPT. 19.

(*Before Mr.* SAUNDERS.)

AN OPPONENT OF A CONSTANT SUPPLY OF WATER TO LONDON.

Mr. *H. Wilson*, owner of some houses at Kennington, appeared on an adjourned summons, taken out by Mr. Louttit, Secretary of the Lambeth Water-Works Company, for having contravened the regulations made under the Metropolis Water Act, 1871, "by permitting waste of water, and not supplying proper fittings for the water supply." The case was before the Court on the 22nd ult., and was reported in the JOURNAL. After some discussion upon that occasion, it was adjourned to give the defendant time to carry out the necessary work. Upon the case being again called on, it was stated that the defendant had failed to do the work required.

Mr. *Catmur*, in the service of the Company, proved that the fittings at the houses of the defendant were inefficient.

A long argument ensued. It was urged that the great desire of the Company was to give a constant supply to all houses, and this could only be done by the regulations and the Act of Parliament being obeyed by owners of property. Some thousands of houses had already been furnished as required, and there were but 82 not properly fitted, 22 of which were the houses of defendant.

Mr. SAUNDERS said he must certainly hold with the Company, whose desire evidently was to benefit the public.

Mr. MEAD, on the part of the Company, said there was no desire for a penalty. He would consent to an adjournment for defendant to do the work.

Mr. SAUNDERS agreed to this, and allowed the Company £5 costs.

The case was, therefore, again adjourned.

ABERAVON CORPORATION GAS SUPPLY.—From the accounts of the Corporation Gas-Works, presented to the monthly meeting of the Aberavon Town Council on Wednesday, the 10th inst., it appears that the capital expended on the works to March 25 last was £7552 14s. 9d.—£323 18s. 11d. having been added during the preceding six months. The profit and loss account shows that the manufacturing charges for the half year amounted to £674 15s. 2d. The total on the credit side of the account was £992 0s. 9d. The balance of £317 5s. 7d. was appropriated to the payment of £186 6s. 11d. for interest on loans and banker's interest and commission, the remainder (£130 18s. 8d.) being carried to the depreciation-fund account. The Manager (Mr. John Henderson) reported to the Council upon the damage done to the retort-houses by the late flood, the water rising to a height of 13½ inches in the lower retorts, which were one mass of cracks owing to the sudden cooling they had received. He said he hoped they would be able to manage for the coming winter.

THE GAS SUPPLY OF NEW YORK.—The *American Gaslight Journal* of the 2nd inst. says: "Since our last issue there has been a further modification of prices for gas by the different Gas Companies. The first change was made by the Manhattan, who, retaining their schedule of former prices, for quantities below 25,000 feet per month, announced that the price to consumers of from 25,000 to 50,000 would be 1·50 dols.; from 50,000 to 100,000, 1·25 dols.; and over 100,000 1·00 dols. In a few days after the other Companies came down to 1·50 dols. for bills under 25,000 feet; 1·25 dols. for amounts between 25,000 and 50,000 feet; and 1·00 dols. for over 50,000 feet. These latter prices are offered by the New York, the Mutual, the Municipal, and the Metropolitan alike, although, in some cases, there may be a slight variation in some of the items. What the next move of the Manhattan will be in the way of prices is not yet announced, although it is fair to suppose that, having commenced the reduction, they will keep it up, and reduce still lower. As the weather gets cooler, the fight seems to warm up a little. Every Company employs agents and circulars to maintain its former list of consumers, and add as many as possible to it. The fight is a godsend to the gas-fitters, who are seen moving in all directions, setting meters and making connections. How the actual balance of customers stands, as compared with last June, it would be difficult to ascertain. One thing is certain—viz., that kerosene lamps are disappearing as a consequence of the low price. In one Company alone nearly 200 new consumers have changed from oil to gas, and doubtless the other Companies have a proportionate number."

Miscellaneous News.

METROPOLIS GAS SUPPLY.

THE AVERAGE METER SYSTEM FOR PUBLIC LAMPS.—At the meeting of the Vestry of St. George's-in-the-East last Thursday, the Paving Committee reported upon the results of the recent experiments made with the view of ascertaining whether a saving could be effected in lighting the parish lamps, and paying for the gas by meter instead of per lamp. The experiments led the Committee to the conclusion that it would not be advantageous to the parish to adopt the meter system. Mr. Cox, in moving the adoption of the report, explained that the Committee had taken into account the cost that the Vestry would be put to for supervision and for overlooking the supply of gas, and the other incidental costs, and came to the conclusion that as the parish was at present lit at a cost of £4 6s. 3d. per lamp, equal to a 16-candle illumination, there was no occasion to make any alteration. Mr. Dickson seconded the motion, which was agreed to.

METROPOLIS WATER SUPPLY.

Lieut.-Col. Bolton, in his report to the Local Government Board on the water supplied by the Metropolitan Water Companies during August, says: "The state of the water in the Thames at Hampton, Molesey, and Sunbury (where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, Chelsea, and East London Companies are situated) was indifferent on the 1st and 2nd of August; it then became very turbid, and remained in that condition until the 7th, when it slightly improved, and fined down by the 11th, and was good until the 18th, when it again became indifferent, and increased daily in turbidity until the 22nd, when it was very bad, being turbid and tanned; and it continued in this state for the rest of the month. The highest flood state of the river at West Molesey during the month was 5 feet 7 inches, and the lowest 1 foot 3 inches above the summer level, the rainfall at this place being 5·08 inches. The water in the River Lea was also bad during the whole of the month. (These remarks refer to the condition of the water previous to filtration.) From the general bad condition of the water at the intakes, and the prevalence of floods caused by the heavy rains during August, the filtration of the water supply has been attended with much difficulty, more especially with those Companies not having sufficient storeage capacity and impounding reservoirs to avoid taking in water when floods prevail. The water supplied by the whole of the Thames Companies was much tanned, although clear and bright, and it appears to be impossible to get rid of the discoloration by filtration."

WEST OF SCOTLAND ASSOCIATION OF GAS MANAGERS.

(FROM OUR OWN CORRESPONDENT.)

The Autumn Half-Yearly Meeting of the West of Scotland Association of Gas Managers was held at Bridge of Allan, on Thursday last, under the presidency of Mr. Robert Mitchell, of Coatbridge; and as it will doubtless be some little time before the detail report of the proceedings can be published, it may not be undesirable to give a brief *résumé* of the same.

In consequence of the great distance of Bridge of Allan from what is generally regarded as the west of Scotland, the attendance of the members was slightly smaller than it has been on some former occasions, and the fact that the day of the meeting was also the closing day of the Exhibition of Gas Apparatus at Greenock had doubtless some influence in limiting the attendance. As it was, however, the meeting was an exceedingly interesting one, and a fair amount of satisfactory work was undertaken.

The new Secretary (Mr. Samuel Dalziel, of the Corporation Gas-Works, Kilmarnock) submitted the minutes of Committee meetings for the past half year, the leading feature of which was the proceedings in conference in reference to the proposed amalgamation of the North British and West of Scotland Associations of Gas Managers—a subject which was subsequently discussed at some length by the members present. Mr. Watson, Callander, and Mr. Hamilton, Kilsyth, were then elected as ordinary members.

On assuming his duties as President, Mr. Mitchell delivered an Inaugural Address, which, though short, was most appropriate to the occasion, and marked by sound sense and good taste. It dealt with the prosperity of the Association as indicated by the continued and uninterrupted increase of the membership, and noted, in passing, the utility of the benevolent fund, as exemplified by the vote from it to the widow and family of a gentleman (Mr. Laming) "whose name will ever be connected with gas purification, and the revivification of oxide of iron." Mr. Mitchell subsequently made a retrospective glance over the occurrences of the past six months, his opinion regarding them being that, from a gas point of view, the world had considerably improved. Of course, he touched upon the hue and cry in respect of electricity, which was to supplant gas; but gas, he said, was still being manufactured, sold, and used; and the cry for "more light" had been amply satisfied by gas engineers, both in Scotland and England. Incidentally, also, the proposal for amalgamating the two Associations of Gas Managers north of the Tweed was touched upon; and a passing glance was taken of a process recently patented by a Glasgow gentleman, and called "Improvements in the manufacture of illuminating gas, and the utilization of the impure products resulting therefrom." Mr. Mitchell stated what the leading idea of the patentee was, but he thought it would be difficult to say wherein lay the practical utility of the invention. He expressed much gratification at the success of the Aitken-Young process in the hands of Mr. Bell, of the Gibraltar Gas-Works, as detailed in the letter of that gentleman recently published in these columns; and he afterwards referred to the Greenock Gas Exhibition, and its illustrative examples of the many and varied applications of gas, as in new modes of illumination, in heating and cooking, and in the production of motive power. Some remarks on the utility of gas-governors, the desirability of plumbers and architects understanding what sizes of pipes to order, so as to provide a proper supply of gas for consumers, and on the subjects which might be treated in papers for the next annual meeting, brought the Address to a close, and for which the President was awarded a very hearty vote of thanks.

In the discussion which took place on the amalgamation proposal, several members took part; but, so far as the West of Scotland Association were concerned, it was generally thought that no special benefit could accrue, and it was eventually resolved to defer coming to any decision on the subject till the next meeting, which will be held in April.

An interesting discussion then took place on "Twenty-candle Gas for Scotland," which was the subject of a paper submitted by Mr. Hutchison, of Portrush, to the last meeting of the Association. Mr. Niven, of Dunoon, subjected the proposal to a keen analysis, and entirely scouted it, as also did various other speakers—Mr. Henry Aitken, Mr. M'Gilchrist, Mr. Robert Brown, coalmaster, Mr. Duncan Jeffrey, Kirkintilloch, and the Chairman. The general opinion was that there was no good reason why the Scotch cannel coal should not be used, and that there was no fear of it becoming exhausted for a long time to come; furthermore, it was universally agreed that the more concentrated the form in which gas could be supplied to the consumer the better.

At the conclusion of the discussion the members paid a visit of inspection to the Bridge of Allan Gas-Works, where they were received by several of the Directors and the Manager, Mr. Fotheringham; and before proceeding with the business of the afternoon sitting they were hospitably entertained by the Directors of the Gas Company.

"On Controlling the Supply of Gas from the Gasholder to the Burner" formed the subject of a paper by Mr. D. Bruce Peebles, of Edinburgh; and, as many of the readers of the JOURNAL are aware, a paper on such a subject from that gentleman could not fail to be highly interesting and instructive. As a matter of course, it was beautifully illustrated, and it led to a valuable discussion.

Mr. Carlow, of Port-Glasgow, submitted a paper in the course of which he gave a very complete and picturesque sketch of the disadvantages of manufacturing and supplying gas with deficient plant, followed by a statement of the results attained since he had his works reconstructed. The discussion which followed brought forth from the President the statement that while in the old works at Coatbridge his expense for purifying last winter amounted to 3d. per 1000 feet of gas, in the new works it had been reduced to ½d. per 1000 feet, thus showing the value of a large area or surface in purifying operations.

The concluding paper was by Mr. Cheyne, of Briton Ferry, South Wales, which chiefly dealt with a mode of retort-setting and dip-pipe arrangement which had in his experience proved very successful. After the discussion upon it, a vote of thanks was passed to the President for his conduct in the chair.

At four o'clock the members sat down to dinner in the Royal Hotel, Mr. Mitchell being again in the chair, while the duties of the vice-chair were discharged by Mr. Carlow. Several Directors of the Bridge of Allan Gas Company were present as guests.

On Friday a large number of the members and their lady friends had a most enjoyable excursion to Alva Glen, in the heart of the Ochil Hills, and to the ruins of the far-famed Castle Campbell, near Dollar.

The Fifteenth Half-Yearly Meeting of the West of Scotland Association of Gas Managers was held last Thursday, at Bridge of Allan—Mr. R. MITCHELL (Coatbridge), the President of the Association, in the chair.

ELECTION OF NEW MEMBERS.

The following gentlemen were elected members of the Association:—

ORDINARY MEMBERS.

Hamilton, W.	Kilsyth.
Watson, W. M'Q.	Callander.

EXTRA-ORDINARY MEMBERS.

Galloway, — . Tar distiller	Pollockshaws.
Rennie, J. . . Tube manufacturer . . .	Glasgow.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Before beginning the business of the meeting, you will allow me to express my most cordial thanks for the honour you have conferred upon me in electing me to the Presidency of this Association, which, I am happy to say, occupies a most influential position among the institutions of our profession. In taking the chair this morning I have considerable diffidence, but with your indulgence and generous aid I venture to hope that this meeting may prove as interesting and profitable as any of our former gatherings. As the main object of our Association is to mutually improve each other, and to advance the science of our profession, I trust the same vigorous interest will be manifested, and the friendly interchange of opinion reciprocated, as on former occasions.

Nothing is more gratifying to the members of any association than its continued success, and no better indication of the prosperity of our Association can be given than the continued and uninterrupted increase of its membership. This, I think, indicates that the benefits accruing from the interchange of opinion and the careful consideration of the various subjects brought forward for discussion have, to a great extent, been appreciated by members of our profession.

During the half year there have been no claims on the Benevolent Fund by members of the Society, but I am sure you will be pleased to know that we have been able to render a little assistance to the widow and family of a gentleman whose name will ever be connected with gas purification and the revivification of oxide of iron. I consider this fund one of the most pleasing features of our Association. Nothing is more calculated to excite feelings of pleasure than the assurance that one has been able to alleviate the distress of his fellow—distress, it may be, brought on by protracted illness, or by circumstances over which the sufferer has no control.

I have remarked that our Association is intended for our improvement. As a means towards this end, free and open expression of opinion must exist. Freedom of thought is enjoyed by all; but this freedom is ineffective, unless accompanied by freedom of speech, and unless freedom of action be the outcome of both. Thought, undoubtedly, is the grand central motive power of society, out of which all progress springs. The amount of progress will be in proportion to the facilities afforded for its growth and culture. How much has been accomplished by the advancement and development of science in our day! Great engineering undertakings have been carried through, which could not have been conceived but for the progress of thought. The achievements of others, then, ought to stimulate and encourage us to apply ourselves with all vigour to whatever comes before us. In our own, as in all other associations, "many men, many minds," and consequently opinions differ. The expression of such opinions ought always to be made with clearness, gentleness, and moderation; and should an opinion expressed not be in accordance with the views of other members, the same ought to be made known in a friendly and frank manner, bearing in mind that the true principle of discussion on any subject ought to be that a clearer conception may be entertained, and the liability to error lessened, and to have the satisfaction of knowing that we have gained valuable information, and have formed clearer views on the subjects under consideration. Men persevere and overcome most when their own active energies are in operation for the promotion and furtherance of their own heart's wishes. There can be no satisfaction in a quiescent passiveness. It cannot be compared with the benefits arising from self-application and persevering persistency—not in the seeking of our own individual gratification, when opportunity serves, because that is too contracted to comprehend wide consequences, and makes men slaves to feeling instead of being independent and free. While touching upon this topic, perhaps you will permit me to remark that the gas managers of Scotland have long desiderated the establishment of a journal in their midst which would fully and fairly represent their opinions, and which would, at the same time, be a suitable medium for the interchange of views on special topics as they cropped up. By the establishment of the *Journal of Artificial Light* we have been, during the past year, favoured with such a medium; and as the *Journal* is about to enter on the second year of its existence, and as it exhibits a wonderful amount of vigour for its age, I trust that all gas managers will see it to be their duty and interest to give the *Journal* that amount of support which it deserves.

Casting a retrospective glance over the occurrences of the bygone six months, I am glad to be able to say that the world, from a gas point of

view, has considerably improved. The hue and cry that electricity was about to supplant gas has subsided, and gas is still being manufactured, sold, and used. I would not for a moment have it supposed that gas managers, Othello-like, ever dreamed that their occupation was gone, or ever entertained the remotest idea that electricity was to occupy the proud position of ousting gas from the circle of illuminants; but others, less familiar with the *minutiæ* of these matters, were unfortunately trapped into parting with their scrip, and only when too late have they realized the hollowness of the claim for electricity that it could be produced at less cost than gas. Standing, as we do, on the very threshold of electrical science, it behoves us to make ourselves as familiar as possible with the purposes to which this subtle element can be applied; not because there is any present danger of it entering the domain of gas, but in order that every manager in Scotland may be in the position of giving an intelligent reason to his directors why electric wires can never supplant gas-mains, or carbon points gas-burners. It would be idle for me to take up your time further with this subject at present. The greatest minds of the age are applying themselves to solve the mystery of what may be regarded as one of Nature's enigmas; and while we may be able to form practical opinions, based upon the result of their researches, we can meanwhile only stand by as the work of investigation proceeds. While I make this passing allusion to the problem of electric lighting, it is right that I should also mention, in a word, that great advances have been made in the way of lighting by gas. Occupying the position I do to-day, it would perhaps be invidious on my part to make mention of any particular invention; but, at the same time, it is perfectly plain to every one that the cry for "more light" has been amply satisfied by gas engineers, both in Scotland and England.

But leaving the past and coming to the present, you will observe from the programme of business that a most important subject is to be brought up for discussion—viz., the amalgamation of the North British Association of Gas Managers with the West of Scotland Association. On this I shall say but little, as I have no wish to anticipate the remarks of any gentleman, or the finding of the meeting. I will simply refer to one of the advantages which might reasonably be expected from having a Central Association. It is not a question as to which Association is to be looked upon as the most successful, but the establishment of an Association in Scotland which will occupy the position of having all the District Associations as subordinates. By this means there would be a higher platform for the submission of papers on subjects upon which the District Association might consider it advisable to have a wider range of intellect brought to bear. This, I say, is one of the advantages of having a Central Association. But as to the amalgamation of the two Associations, you shall have presently an opportunity of considering what steps ought to be taken in the matter.

A few months ago there was brought before the public a process by Mr. A. Miller, of Glasgow—viz., improvements in the manufacture of illuminating gas and the utilization of the impure products resulting therefrom. The idea of the patentee is, taking his specification as my guide, to use nothing but common coal dross or tripping, and to procure therefrom a gas of 28-candle power. He proposes to allow the first part of the charge to escape into a separate main, where it can be used for firing or heating purposes; the intermediate portion of the distillation is allowed to pass into the holder for supplying the consumer; and what is called the sedimentary part of the distillation is cut off, and allowed to pass into the first-mentioned main. He says that 8000 feet per ton of 28-candle gas, can thus be obtained. Whether or not in practical working his most sanguine expectations have been realized, I have no information. But any one who is at all acquainted with the distillation of coal for gas manufacture, will, I think, have considerable difficulty in observing the practical utility of this invention. While on this topic—namely, the improvement of gases in their production—I have no doubt that many members will be gratified with the announcement from Mr. Alexander Bell, of the Gibraltar Gas-Works,* as to the satisfactory results obtained by him by using the Aitken and Young analyzer. I need not refer further to it, but coming as it does from a gentleman of Mr. Bell's standing and experience, it augurs well for its success. The principal advantages are not only the high quality of the gas obtained without the use of cannel coal, but the entire absence of that troublesome naphthaline deposit which our southern brethren are so much annoyed with.

The many and varied applications of gas for illuminating, heating, and cooking purposes are well worthy of our individual study and close attention. Gas in its original sphere—that of an illuminator—has outstripped the most sanguine expectations. Who can look upon the magnificent Sugg burner, while it fills the large area with a subdued and soft light, without feeling that, with applied skill, gas cannot be excelled—shall I not say even equalled—as a means of illumination? Its application is *ad libitum*. There is no such thing as exhaustion of the subject, either in the means of production, regulation, or general distribution and consumption. Any one who has visited an exhibition of gas apparatus, such as was held at Greenock, cannot fail to see the great field of a bright future for gas companies, and each manager ought to adopt every means in his power for the spread of information, and try to give the public an opportunity of becoming acquainted with the advantages of employing gas as a means of heating and cooking. It is, beyond doubt, superior to coal or any other fuel as a means of cooking, in regularity, cleanliness and convenience, and cheapness. I need not make any allusion to the various modes of its application in stoves; their number is great, and the designs are various, each maker striving to give the maximum return for the quantity of gas consumed.

Gas as a motive power has been turned to good purpose in the Otto, the Eclipse, the Cropper, and the Bisschop engines. This latter engine was to be seen working at Greenock. Its construction is simple; the working parts could be easily repaired, if need be; its action is perfect; and the cost, I trust, will become even more moderate. It is the intention of the patentee to have them reduced in size, so that they will become a piece of general furnishings, and serve as an accompaniment to the sewing and washing machines.

The benefits arising from the proper control of pressures from holder to consumer is a subject deserving the most careful consideration. Governors of various designs, and on different principles, have been before us more prominently of late. The advantages of these on home consumption is very great, and ought to form one of the manager's points in the education of the consumers. By the adoption and supervision of the burners by the gas inspector, I am convinced that a more friendly feeling would exist between the consumers and companies generally. Were the consumer to see that an interest is taken in his procuring the greatest amount of light for a given sum, then hard sayings and indifferent expressions would cease, and the manager would not be looked upon as the person who is exacting what is not due to him.

While referring to the distribution, one point of importance is to have the architect, as well as plumbers, to understand what size of pipe is necessary for the proper supply of tenements under their charge in erection. At one of our former meetings a suggestion was made that a tabulated form should be drawn up, with instructions for the proper carrying out of this most important part of the distribution. I think a manager who does not take an interest in seeing that the consumer is to have at his command a good and sufficient supply, is guilty of a dereliction of duty in the first place, and throws himself open to a great amount of unnecessary trouble afterwards.

I trust that, before our annual meeting, some of the members will give some of the important points in the manufacture of gas their close and vigorous attention. May I suggest the subject of retort-setting—the most advantageous internal size of arch, number of retorts in one setting, their size, and number of fires to each setting. As the subject of gas manufacture is wide, so is the experiences of the members; and I hope that at next meeting there will be a large number of interesting papers, as we must look upon it as every one's duty to apply himself with all vigour to the advancement of our profession.

On the motion of Mr. ADAMSON (Airdrie), a vote of thanks was passed to Mr. Mitchell for his very able and exhaustive Address.

(To be continued.)

* See JOURNAL for the 9th inst., p. 398.

ROCKHAMPTON (QUEENSLAND) GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Thursday, June 19—Mr. JOHN FERGUSON in the chair.

The SECRETARY (Mr. H. Mills) read the following report:—

The Directors have the pleasure of reporting to the Shareholders that the progress and prospects of the Company are satisfactory. The balance-sheet shows, a favourable increase of the profit and loss account. These results of the half year's business are due to the extensions of mains, to cheap coal, and attention to details in manufacture and distribution.

Fifty tons of gas-mains are expected to arrive in a few weeks, and a further shipment of 50 tons has been ordered. The purchase of these has been made on advantageous terms, and will enable the Company to lay three miles of extensions.

At the last meeting the Shareholders approved of an increase in the rates of discount allowed to consumers, and although this has been followed by good results, the consumption of gas is still less than your Directors wish to see; and in order to encourage more free use of gas, the Directors recommend for your approval that a reduction be made from 17s. 6d. to 15s. per 1000 feet, and the present rates of discount continued; and with the view of increasing the day consumption they propose a special rate for gas cooking-stoves—viz., 20 per cent. discount, thus bringing this excellent mode of cooking within the reach of all classes. This is expected to be a new and large source of revenue to the Company.

The Directors recommend payment of a dividend at the rate of 10 per cent. per annum, with a bonus of 1½ per cent. in addition for the past half year.

The Directors have much pleasure in testifying that the buildings and plant are in good order and condition. To meet the expected increase contemplated by the reduction of price, more retorts have been ordered, so that before another winter season the Company will be able to send out a much larger daily supply of gas.

The Directors take the present opportunity of expressing their entire satisfaction with the Secretary, who faithfully and efficiently performs the duties of his office, and with the manner in which the Engineer carries out the working operations of the Company

DR. *Profit and Loss Account, for the Half Year ending May* 31, 1879. CR.

Manufacture, distribution of gas, and management. .	£905	17	8	Balance, Nov. 30, 1878 . .	£833	16	2
Discounts on gas-rents . .	136	1	9	Sales of gas, coke, and tar .	2,216	8	6
Bad debts written off . .	15	7	2	Scrip and transfers . . .	1	1	0
Wear and tear and depreciation	100	0	0	Rent of dwelling-house . .	22	10	0
Bank interest	8	16	4				
Reserve-fund	172	9	8				
Dividend, Nov. 30, 1878. .	661	6	6				
Profit this half year . . .	1,073	16	7				
	£3,073	15	8		£3,073	15	8

Liabilities and Assets.

Capital	£15,000	0	0	Fixed investment. . . .	£13,710	10	4
Less due and not called up .	1,773	6	0	Floating ditto (coal, coke, and tar)	530	10	0
	£13,226	14	0	Sundry debtors	571	5	0
Reserve-fund	718	9	11	Due from insurance . . .	355	7	0
A. J. S. Bank	151	17	11	Cash in hand	3	6	1
Profit and loss.	1,073	16	7				
	£15,170	18	5		£15,170	18	5

The CHAIRMAN said he might fairly congratulate the Shareholders on the present position and prospects of the Company. The report spoke for itself, and there was little need for him to enter into details; but there was one recommendation to which he might refer—viz., the reduction from 17s. 6d. to 15s. per 1000 feet. This was certainly a large reduction to make; but the Directors had fully considered the matter, and, anticipating that a much greater consumption of gas would be the consequence, they proposed the reduction. He considered that their first duty as Directors was so to manage the business as to get a remunerative return for the capital invested, and their next duty to sell the gas at the lowest rate consistent with obtaining a fair profit; and this they were trying to do to the best of their ability. The proposed reduction, with the discounts for cash, would enable consumers to get gas at 13s. 6d. per 1000 feet. The Directors also proposed to have a special rate for gas cooking-stoves, giving to those who used gas in this manner a reduction of 20 per cent., making the price 12s. per 1000 feet. The Shareholders would thus see that the Directors were trying by every possible means to encourage the consumption of gas. They also intended to extend the mains a further length of three miles. By doing this, they would be able to reduce the price of gas, as they considered the consumption would proportionately increase. He was glad to state that the works were in good order; everything was going on satisfactorily, and they had had no complaints. This he considered was due to the care and attention on the part of their officers; and he thought he might say that the works were never before so well conducted as they were at present. For this state of things the thanks of the Shareholders were due to the Officers. He noticed that the Council had inquired of the Secretary the cost of lighting 12 street-lamps. This he was glad to observe, and he hoped a much larger number would soon be required. He moved the adoption of the report and balance-sheet.

Mr. CONNOLLY seconded the motion, which was passed unanimously.

Mr. REES R. JONES proposed that Messrs. John Ferguson and Henry Jones be re-elected Directors of the Company.

Mr. LEIGH seconded the motion, which was agreed to.

On the motion of Mr. JONES, seconded by Mr. HEADRICK, Messrs. W. Jackson and W. H. Buschel were re-elected Auditors.

Mr. LIVERMORE moved a vote of thanks to the Directors and Officers.

The proposal was received with applause, and the meeting then separated.

SURCHARGING A LOCAL BOARD.—At the last audit of the accounts of the Bradford-on-Avon Town Commissioners, there was an item of about £620 connected with the proceedings of the Board in opposing the Trowbridge Water Company in Parliament, when the Company applied for powers to carry their water to Bradford. The Auditor refused to certify this item, on the ground that there was not a majority of the Board present when they resolved to oppose the Company's scheme. The surcharge will fall on the eight members who were present.

BRISTOL UNITED GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday—Mr. F. T. TERRELL in the chair.

The SECRETARY (Mr. H. H. Townsend) read the notice convening the meeting, and the following report was taken as read:—

The audited accounts of the Company for the half year ended the 30th of June last are herewith submitted to the Proprietors, and the Directors doubt not will be deemed upon examination to be satisfactory.

It affords the Directors great pleasure to be able to announce the very near completion of the new works of the Company at Stapleton. The building of these works has been carried on with unceasing vigour and attention by Messrs. Aird and Sons (the Contractors), under the able supervision of Mr. Fiddes (your Engineer), and the manufacture of gas will be commenced at the new premises within a few weeks from the present date. These works will be wholly completed, ready for the supply of gas, within ten months from the day of their commencement; and, considering their magnitude and the excellence of the workmanship, will be an example of energy and rapid execution which the Directors believe to be unprecedented in the history of gas lighting.

One hundred millions of cubic feet of gas have been made and distributed (under great difficulties) in the past year, over and above the quantity which was made at your two stations in the previous year, and this fact alone will demonstrate the urgent necessity for the prompt erection of the additional means of manufacture and distribution.

The cost of the works at Stapleton, including the purchase of the land, will be about £120,000. A portion of this charge has already been met by sales of stock previously effected, and to meet further payments the Directors will proceed to sell on the 19th inst. the remaining £20,000 of the capital stock of the Company, for which the authority has already been given to them by the Proprietors.

Three of the Directors retire at this meeting by rotation—viz., Mr. Jones, Mr. Wills, and Mr. Metivier; also one of the Auditors, Mr. Grace, the whole of whom are eligible for re-election.

The Directors recommend that a dividend at the rate of 10 per cent. per annum on the capital of the Company entitled to dividend be declared, subject to the deduction of income-tax.

[The capital of the Company consists of £341,250 of 10 per cent. stock; and £101,500 of loans and debenture stock bearing interest at 4 and 4½ per cent.—£83,700 at the lower rate. The Company are authorized to raise £170,000 more stock, and to borrow an additional £46,000. The profit and loss account shows that, after providing for interest on mortgages and debentures, there remains a sum of £25,905 15s. applicable to dividend on ordinary capital. During the half year to June there were 51,082 tons of coal and cannel carbonized.]

DR.—*Capital Account, June* 30, 1879.

	Expenditure this Half Year.	Total to June 30, 1879.
To Expenditure to Dec. 31, 1878		£508,981 8 7
Since that date—		
Lands acquired, including law charges	£548 13 11	
New buildings, manufacturing plant, machines, storeage works, and other structures connected with manufacture	29,334 5 1	
New mains and service-pipes, including laying, paving, and other works connected with distribution	1,837 6 4	
Gas-meters	406 7 0	
		32,126 12 4
Total expenditure		£541,108 0 11
Balance		32,717 7 10
		£573,825 8 9

CR.—*Capital Account.*

	Certified Receipts to Dec. 31, 1878.	Received during this Half Year.	Total Receipts to June 30, 1879.
By Stock (ordinary)	£321,250 0 0	£20,000 0 0	£341,250 0 0
Stock (debenture)	53,350 0 0	7,500 0 0	60,850 0 0
Mortgages and bonds	46,650 0 0	—	40,650 0 0
Premiums realized on stock sold by public auction (not entitled to dividend)	116,343 18 9	14,731 10 0	131,075 8 9
			£573,825 8 9

DR.—*Revenue Account, for the Half Year ending June* 30, 1879.

To Manufacture of gas—		
Coal and fuel	£33,235 9 0	
Purifying materials	1,019 17 11	
Salaries of Engineer, Superintendents, and Officers at works	1,220 0 0	
Wages at works	10,962 12 2	
Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials, and labour	6,849 6 5	
		£53,287 5 6
Distribution of gas—		
Salaries of Inspectors of mains and meters, and Clerks in meter office	£301 18 6	
Repairs, maintenance, and renewal of mains and of service-pipes, including materials, laying, paving, and labour	1,786 0 5	
Repairing, renewing, and refixing meters	535 10 5	
		2,623 9 4
Public lamps—Lighting and repairing		1,779 5 7
Rates and taxes		2,180 6 5
Management—		
Directors fees	£500 0 0	
Salaries of Secretary, Accountant, and Clerks, &c.	1,415 13 9	
Collectors salaries	852 10 0	
Stationery and printing, &c.	281 8 6	
General establishment charges and incidentals	260 8 5	
Auditors fees	42 0 0	
		3,352 0 8
Law charges		100 2 6
Bad debts account		700 0 0
Total expenditure		£64,022 10 0
Balance carried to profit and loss account		20,213 15 4
		£84,236 5 4

CR.—*Revenue Account.*

By Sale of gas—		
Private consumers	£56,982 2 1	
Public lamps	7,513 15 5	
		£64,495 17 6
Rental of meters		2,237 13 2
Residual products—		
Coke and breeze	£10,847 12 9	
Coal tar	3,924 18 6	
Ammoniacal liquor	2,423 5 0	
		17,195 16 3
Rent of freehold premises		85 11 5
Transfer fees		10 15 0
Interest on cash at Bankers		22 15 1
Discounts and allowances		187 16 11
		£84,236 5 4

The CHAIRMAN said the Shareholders had no doubt observed that the most prominent feature in the report was the account given of the completion of a portion of the new works at Stapleton. One word, however, made a great difference in the report. The word "completion" was found fault with by some of the Directors, but it was too late for amendment, the report having been printed and sent out. The insertion of the words "completion of the works" would give many persons the idea that the entire works had been completed. Such was not the fact, and it would be better that they should know the real state of affairs. The word "completion" related only to the portion of the contract which had been taken by Messrs. Aird and Sons. That was in itself a most wonderful work. He had had the opportunity of seeing it both above the ground and under the ground, and he thought it could not be excelled by any gas company in the kingdom. The work cost a considerable sum, but a great undertaking could not be accomplished without considerable expense. The tanks were of very large size, they were beautifully built, and it seemed almost a pity to put them under ground. Through the exertions of Messrs. Aird and Sons, the Contractors, and Mr. Fiddes, their own Engineer, the work had been advanced so far that the Directors could confidently state that the ten months allotted for it would place them in a position to manufacture gas at the new works. They would then be able to supply any amount of gas that might be required. It was rather urgent that the work should, if possible, be completed within the time, because in the last half year they had been called upon to furnish an additional 100 million feet of gas, and, unless they had these new works, they would find great difficulty in supplying the constantly increasing demand. They could now make gas to any extent they were likely to be called upon for. He repeated that they were much indebted for this to Mr. Fiddes, who had worked night and day. On two or three occasions at these meetings he (the Chairman) had ventured to say that he saw nothing to fear from the electric light. The light was undeniably a splendid one, and nobody could deny its brilliancy and beauty; but the only damage it had done gas companies as yet was to reduce the price of their shares. There was a scare, and the price of the shares fell. When, however, they looked at the fact that the Company were about to manufacture 100 million feet more of gas than usual, notwithstanding the electric light, he thought he might venture to repeat what he had said before—that they had nothing to fear from the light. He moved the adoption of the report and accounts.

Mr. T. T. TAYLOR seconded the motion, and said he thought that all connected with the Company ought to be proud of the new works at Stapleton, which were necessitated by the increased demand for gas expected to arise during the coming winter. It was found that there was a great consumption of gas for other purposes than that of lighting, and he believed the demand would increase. This must assure the public that the £20,000 of the Company's stock which was to be offered for sale on the following Friday was really a desirable investment. He had no doubt that there would be a good sale, and that high prices would be reached.

Mr. R. W. GILES said the cost of the new works was put down at £120,000. They had already issued £20,000 new stock, which realized £35,000, and they were now about to issue another £20,000, which would probably fetch a similar amount. Upon that the Company would be entitled to issue debentures to the extent of £13,000, making a total of about £83,000. That would leave a balance of £40,000. They had not yet taken power to issue that, and he thought it would be some guide to purchasers at the sale on Friday if they were informed when the remaining stock was likely to be issued. He remarked that in London a great deal of interest was felt in the statement made that they had succeeded in Bristol in getting a double amount of light from the street-lamps. The announcement had been spread widely, and a good deal was thought of the experiment at a distance; but he found the people in Victoria Street were scarcely aware of any additional illumination. At any rate, the same rule would apply here as anywhere else, that a certain amount of gas would produce a certain amount of light, and no more.

The CHAIRMAN pointed out that the expenditure of £120,000 included the purchase and conveyance of land, which cost about £40,000 or £50,000. They had to drive a hard bargain with the landowners, as, immediately adjoining owners found that the Gas Company were purchasing the land, they all became convinced that the works would be a nuisance, and they threatened them with difficulties to be thrown in the way of their getting their Act. The only means of ridding themselves of those difficulties was to purchase the land, which they did to the extent of £40,000 or £50,000.

In reply to Mr. Giles, the CHAIRMAN said when the Company had raised this £83,000 they would have cash in hand to meet their liabilities.

Mr. SPARK said they would have to come again for power to sell the other £20,000. It might be at the end of this year or the beginning of the next.

The motion was then put and carried unanimously.

On the motion of the CHAIRMAN, seconded by Mr. METIVIER, a dividend at the rate of 10 per cent. per annum was declared.

On the motion of the CHAIRMAN, Messrs. S. Jones, G. Wills, and C. Metivier were re-elected Directors, and Mr. Henry Grace was re-elected one of the Auditors.

Mr. GILES suggested that some substantial recognition of the services of Mr. Fiddes, the Engineer, ought to be made by the Directors, for Mr. Fiddes had, he said, worked night and day about the new works.

Mr. HEWITT said he thought the gratitude of the Shareholders was due to Mr. Fiddes for his unflagging labours, and the success attending them, in carrying out the new works. He considered that something more substantial than a vote of thanks should be awarded him, and he proposed that the matter should be left to the discretion of the Directors.

Dr. HIGHETT seconded the proposition, which was unanimously carried.

On the motion of Mr. GILES, a vote of thanks was given to the Chairman, and the proceedings terminated.

MORECAMBE GAS COMPANY.

The Twenty-second Annual Meeting of this Company was held last Tuesday—Mr. W. ROPER in the chair.

The SECRETARY (Mr. W. Stephenson) read the notice of meeting, and the following report was presented:—

Your Directors recommend the payment of a dividend for the past half year at the rate of 8 per cent. per annum, free of income-tax.

The Shareholders are to be congratulated upon having obtained statutory powers during the late session of Parliament. The present Company will in future be known as the Morecambe Gas and Light Company. The capital and borrowing powers of the Company will be increased to £45,000, and various other provisions are contained in the Act, which your Directors expect will prove beneficial to the interests of the Shareholders.

The whole of the Directors retire at this meeting, and are eligible for re-election at the first meeting of the new Company, which will be held at the conclusion of the general meeting. Two Auditors, Shareholders in the new Company, must also be appointed.

The CHAIRMAN, in moving that the report and statement of accounts should be received and adopted, said that the Company was formed in 1858, with a share capital of £2000, which had been gradually increased to £15,600. The Company was started to supply the township of Poulton, Bare, and Torrisholme with gas, and the Directors had endeavoured to carry out all their original intentions. At the time of the formation, the number of houses in the township was 372, and at the present time they numbered 924, of which 76 were at a distance exceeding 300 yards from

the gas-mains, leaving 848 to be supplied, and of this number 764 had applied to be connected. Thus the number not supplied only amounted to 84. He mentioned this fact because it had been stated in another place that one-third of the houses in the township were not supplied with gas. The rates of dividend had been gradually increasing year by year, and on looking back at the progress made by the Company there was no reason why the Shareholders should be discouraged, or doubt that in the future the Company would have a very prosperous business. The usual thing in gas companies was for the consumption of gas to double itself in ten years; but the Morecambe Gas Company had succeeded in achieving that object in seven. They existed on sufferance until the present year, when they went to Parliament, and obtained statutory powers. It was not the result of a hasty determination on the part of the Directors, as they had for many years had the subject under their consideration. Such matters deserved a deal of attention, especially when the powers of Directors were limited.

Mr. TETLEY seconded the motion.

In reply to a SHAREHOLDER, who complained of the smallness of the profits realized by the Company during the last six months,

The CHAIRMAN alluded to the depression in trade which had prevented as many visitors as usual resorting to Morecambe this year. He, however, anticipated that the amount of gas sold by the end of twelve months would enable them to recommend a dividend of at least 10 per cent. If coals increased in value, there was nothing to do but to advance the price of gas. By their new Act of Parliament they could increase the price of gas as they chose. The present price was 5s. 5d. per 1000 feet, but there was nothing to prevent them putting it up to 5s. 8d., and this increase in twelve months would enable the Directors to present a very different statement of accounts than on this occasion. No doubt a large share of the expenses for the year had fallen on the past six months. He did not see any reason whatever to doubt the future prosperity of the concern, and trusted to be able to pay not merely 8 per cent., but a still larger dividend. He hoped next year the Shareholders would have 10 per cent., and possibly a little over.

In reply to another Shareholder,

The MANAGER (Mr. W. Duff) said the time the Company made their profits always had been and was comprised in the last two quarters of the year, from July to December. So far as coals were concerned, they were paying a good price for them; but he had no doubt that in the next statement of accounts there would be a great reduction.

Mr. FLEMING said the Company were now bound to supply the whole township with gas; and as Morecambe extended they would have increased business, and, he hoped, larger profits.

The motion was then put and carried unanimously.

The CHAIRMAN moved that a dividend for the past half year at the rate of 8 per cent. per annum, free of income-tax, should be paid.

Mr. BRIGGS seconded the resolution, which was agreed to.

The CHAIRMAN moved that the affairs of the Morecambe Gas Company, Limited, should be closed, pursuant to the Morecambe Gas Act, 1879.

This proposal was seconded by Mr. BRIGGS, and carried.

Mr. WELCH said, however much they regretted the present position of the Company, on looking back they must allow that it had been fairly successful, and as this success was undoubtedly due to the attention of the Directors, the Shareholders ought to feel grateful for the care which had always been exercised over their interests, and for the judgment which had been shown from time to time in keeping pace with the requirements of the town. The success in obtaining a new Act of Parliament, too, was due to the energy of the Directors, and he assumed, for his own part, that as they had only given to them during the past year the small sum of £10, they should vote them a further sum. It was due that they should recognize the services rendered, especially those of Mr. Roper.

Mr. FLEMING thought it was only fair that the Directors should receive some remuneration, and especially the Chairman. That gentleman had had great experience in bringing Bills before Parliament, and his services had undoubtedly saved the Company much money they would otherwise have had to pay.

The CHAIRMAN said he thought that although the Directors only received something like 23s. a year for their attention at the Board, the balance in hand should be carried forward to the credit of the reserve-fund of the new Company.

Mr. WALKER proposed that £150 should be awarded the Directors.

Mr. SIMPSON seconded this motion, which was put and carried.

The CHAIRMAN acknowledged the kindness of the Shareholders, but at the same time intimated that it was the unanimous wish of the Board—six of whom, out of seven, were present—to decline the sum, but they would accept fifty guineas to divide amongst the officers. He proposed that the surplus, exclusive of that sum, should go to the credit of the reserve-fund of the new Company.

Mr. GALLOWAY seconded the motion, which was carried.

Mr. WELCH thought there could be no doubt that all the Shareholders were desirous that their wishes should be carried out. He considered the manner in which the Directors had acted was very creditable to them, and he thought the interest they evinced in the Company was never better shown than at the present time.

It was then resolved that the seal of the Company should be destroyed, and this concluded the last meeting of the Morecambe Gas Company, Limited.

The First Ordinary Meeting of the Morecambe Gas and Light Company was then held.

The following gentlemen were elected Directors:—Messrs. W. Roper, Briggs, Tetley, Whiteside, Simpson, Birkett, and Baxter, whose remuneration was fixed at fifty guineas per annum.

Messrs. W. G. Welch and E. Clarke were elected Auditors, and twelve guineas was voted for their salary.

A vote of thanks to the Directors was then passed, and the meeting ended.

At the completion of the business, the Directors and Shareholders adjourned and partook of luncheon together.

Mr. W. ROPER occupied the chair, and Mr. BRIGGS the vice-chair.

Mr. FLEMING proposed—"The Morecambe Gas Company," which was responded to by Mr. M. SIMPSON and the CHAIRMAN, the latter of whom said that in his speech he had omitted a statement, which was to the effect that the Company intended, instead of allowing 8 per cent. discount for cash payments to customers, to reduce the price of gas to 5s. per 1000 feet, in lieu of charging 5s. 5d., as at present, collected net.

Mr. WELCH proposed—"The Officers of the Company," which was replied to by Mr. DUFF, the Manager, and Mr. STEPHENSON, the Secretary.

The proceedings terminated after the health of the Chairman had been proposed and acknowledged.

WATH-UPON-DEARNE GAS AND LIGHTING COMPANY.—Under this title there has been converted to a limited company the business of the Wath-upon-Dearne Gas and Coke Company. It was registered on the 13th inst., with a capital of £20,000 in £20 shares.

ALEXANDRIA WATER COMPANY, LIMITED.

An Extraordinary General Meeting of this Company was held on Wednesday, the 17th inst., at Stafford House, St. James's, under the presidency of His Grace the DUKE of SUTHERLAND, the Chairman of the Company, to consider the expediency of purchasing the Ramle Water-Works.

The SECRETARY (Mr. Frederick Sanders) having read the advertisement convening the meeting,

The CHAIRMAN said they would remember that the last time they met they deferred the consideration of buying the Ramle Water-Works, as a strong protest came from Egypt. That matter had since been well ventilated. They would hear the protest from Egypt read, and also Mr. Easton's answer, and he thought they would unanimously be of opinion that there was not so much in the protest, and that the Ramle Water-Works ought to be bought.

At the request of the Chairman, Mr. EASTON then read the protest, the signatories to which returned thanks for the adjournment of the former meeting in order that their objections might be inquired into, and they further acknowledged the receipt from his Grace of the report of Mr. Easton. Mr. Easton, they continued, maintained that their opposition was ill founded when they said that the price—£37,500—was excessive as compared with that paid by Mr. Zervoudaki, and argued that this sum represented only 18½ years income of the Ramle Water-Works, taken at its present rate—£2000 per annum—whilst in England from 22 to 25 years purchase would be a fair price; and he further remarked that in future the income of the Ramle Water-Works would be £3000. Thus Mr. Easton drew a conclusion that the price would be very reasonable. In reply to that, they said that they were in Egypt, and not England. In England sound business and veracity was the rule; in Egypt there was great uncertainty and irregularity in every speculation. How was Mr. Easton going to guarantee the continuance of the return of £2000 per annum from the Ramle Water-Works? They were old Egyptians, knowing the actual state of matters, and therefore better judges than a person so new to Egypt as Mr. Easton was. They were clearly of opinion that Ramle was not progressing; on the contrary, the local value of rent and house property was daily diminishing, on account of the extension of Alexandria in an opposite quarter, within the range of supply of the Alexandria works, and in their opinion this reducing value would continue. They were also of opinion that the anticipated income of £3000 would not be realized, and that the present £2000 would probably fall off, and they maintained that the price—£37,500—was excessive and burdensome. Mr. Easton contended that the water for the Ramle Water-Works being taken from a higher level than that of Alexandria, much advantage was gained, but they could not admit this view. Mr. Easton's contention that the Ramle water might serve as a feed for the Alexandria service appeared to them untenable. The distance between the two points was such that without incurring great expense for canalization and machinery his idea was unpractical, and in considering this point they could not lose sight of the fact that of late grievous complaints from the Press and from Proprietors had been made concerning the Ramle service. The idea of a competition between the Ramle and the Alexandria Companies was purely hypothetical, the services being for separate places and under separate concessions from the Government. Mr. Easton further set up his own experience against local knowledge and opinion, but they would remind him that the best of engineers might err, and that the Beyrout Water-Works up to this day had never paid their Shareholders one penny. Should the proposed purchase be made, the following results might be anticipated by the Company. The seller, Mr. Zervoudaki, would have 7 per cent., while a purchase at £37,500, together with the necessary expenses against an actual income taken at £2000, as alleged, would only give a return of about 5 per cent., so the immediate loss must be clear. They trusted that the Company would reject the proposal, and in this protest the holders of the secured titles on the Alexandria Water Company joined. The protest was signed, Mr. Easton said, by gentlemen holding about 1000 votes—£20,000. He next read his reply to the protest, stating that the arguments adduced did not in the slightest degree alter his opinion of the great advantage to the Alexandria Company of the purchase of the Ramle Water-Works on the terms agreed upon provisionally, whilst the further particulars he had received from Egypt strongly confirmed him in his previous judgment. They had evidently not understood his letter of the 9th of July, to which their protest referred. In that letter he was not calculating upon any increase whatever in the gross earnings of the Ramle Water-Works to make up the £3000 a year net revenue, which would be immediately obtained, but upon the saving they would be able to effect with the combined management of the two concerns. With the gross return of 98,349 frs. (about £4000) a year at that moment accruing, they would make a clear net profit the first year of at least £3000; so that after paying the 7 per cent. on £37,000 (not £37,500), there remained a sum of over £500 a year available for dividend on the additional capital required for the legal and other expenses, and for the new main for joining the two systems together. As to the further increase in the income, he could only judge by the returns furnished him, from which it appeared that, as far as water-rental was concerned, the revenue had not only steadily increased ever since the establishment of the works, but this year it had done so, and at a higher ratio than before. When also he took into account that not more than two-thirds of the houses in Ramle, as he was informed, used the water, and there had been no really experienced supervision over the regulation of the services now taken on, he was justified in expecting that a very considerable additional income could be obtained from the district without increasing the amount of water pumped. As to the engineering part of the question, the view that the intake of the Ramle works was at a more advantageous point than that of the Alexandria works had received a signal confirmation this summer, for whilst they were suffering from the mixture of the salt water on the occasion of its being let in from the sea, no such effect was produced at the Ramle works, on account of its being higher up the canal. The cost of joining the two systems he had already stated; and he had gone into the matter in great detail. The mains were of ample size to supply at least four times the quantity of water—indeed, they were quite as large as those of the Alexandria works, and the machinery, as he had before stated, was made by a first-rate firm. They could not be erected now, at the present very low prices, for less than from £35,000 to £36,000. Altogether, applying the same principles and judgment to this business as he had done, he believed, successfully, in the case of Alexandria, he was quite satisfied in recommending the Directors and Shareholders to carry out this purchase also, as one that would be equally remunerative, and that would greatly strengthen the position of the Company.

A short discussion followed, and, in reply to questions and observations,

Mr. EASTON said the two Companies had never been antagonistic. There were two distinct services. A great advantage was that by the purchase they would be able to give two services in Ramle. When he put down a second main he could give the inhabitants filtered water. The Ramle works belonged to Mr. Zervoudaki, who was also the largest Shareholder in the Alexandria Company. He recommended the purchase because it strengthened the position of the Company altogether. At present, Mr.

Zervoudaki had 10 centimes per cubic mètre, whereas the Company's minimum (which they received from the Government) was 30 centimes. They would be able to increase the price received at present by Mr. Zervoudaki. The allowable tariff was 50 centimes. The addition of a large income from private people, like that he had mentioned, was of much advantage, and would greatly strengthen their position. He thought his experience, so far, of the working of the Alexandria Company encouraged them to go farther. They had the figures to the 31st of August, and the only defaulter was the Government; but as to this, besides the pecuniary difficulties of the Government, it should be remembered that there was a dispute as to the amount they should pay the Company. They had sent an Engineer down to settle with the Company's Manager the amount that was to be paid. He had returned, but had not yet made his report to the Government, and perhaps they would say that they would not pay till they had received his report. They had, however, paid two months, according to the concession—April and May—and they had offered their Manager payment for the month of June, but in depreciated currency, and he declined to receive it on the ground that they were bound to pay in gold. They had received £9500 in the four months, and after deducting the whole of the expenses—which they were reducing—they had a balance of £4200 on the four months working; and at the end of September, taking the figures on the same basis—allowing for 20 reductions in expenses—they would have a balance of £7660 without counting the four months arrears from the Government; and after paying debenture interest, that would leave a sum to the good of the ordinary Shareholders of about £2900, or something like 3¼ per cent. on the total subscribed capital of the Company. This was for the half year. It was proposed to work the Ramle and the Alexandria works together, because that was where they would get their profit.

Mr. Corner thought that the protest was in strong language, but that the balance of the argument was in favour of the purchase.

The Chairman then stated that the votes represented by the protesting Shareholders were 1005; proxies from Egypt in favour, 1239; proxies in London, 2492; votes of the Directors, 825; together, 4556 votes in favour of purchasing.

Mr. Easton remarked that the majority of the votes in Egypt were in favour of the purchase. He knew that Nubar Pacha, who had not sent his proxy, was in favour of the purchase. Mr. Gustave Oppenheim had sent his proxy, and so had the largest Shareholders in Egypt, and they had all had this matter before them. Mr. Zervoudaki would take payment in any shape—cash, bonds, or shares, or bonds and shares. It was proposed to give him 7 per cent. preference bonds; but nothing was settled yet. They would offer the new shares to the Shareholders first.

The Chairman thought they would hardly be justified in postponing the purchase, considering the immense number of proxies in favour of it.

Mr. Easton, in reply to further questions, said that the paid-up capital was £350,000. The debenture capital was £180,000, and £60,000 fell due in five years, a similar amount in six years, and £60,000 in seven years. Those gentlemen who applied for shares in the first instance, and were disappointed, ought to have the opportunity of taking up the shares for which they applied. They could restore the equilibrium between the share and bond capital by offering to the Shareholders £20,000 worth of shares, and £30,000 worth of bonds—that was, if they took them up.

The Chairman then proposed *seriatim* the following resolutions, which were carried unanimously:—"That the said report be adopted, and the Directors are hereby authorized and instructed to purchase or acquire the Ramle Water-Works upon the terms appearing in the said report, with such, if any, modifications or alterations as the Directors think fit, and as may be agreed upon, and to determine the mode in which the purchase-money shall be paid; and the Directors are hereby further authorized to improve the said water-works in such manner, and to construct in connection therewith such further mains or other works as they shall think expedient." The Directors proposing to provide the necessary funds for giving effect to the foregoing resolution, partly by the issue of further original shares in the Company, it was resolved—"That the intended action of the Directors in this respect is hereby approved." Also—"That the Directors be, and they are hereby authorized to apply any moneys raised, or to be raised, in pursuance of the powers contained in No. 7 of the Articles of Association, or any part thereof, in payment of all or any part of the consideration for the purchase of the said Ramle Water-Works, or the construction of any such further works as aforesaid, or to issue any such securities as aforesaid, direct by way of payment to the persons entitled to the moneys payable in respect of the matters aforesaid."

Mr. Easton afterwards stated that they had put up the two new boilers and reduced the coal consumed from 240 to 178 tons per month, a reduction of nearly one-third, and they hoped to reduce it by one-half. Their expenditure at present was at the rate of about £12,000 or £13,000 a year, instead of £15,000, as stated in his original report. They hoped to give an interim dividend of 3 per cent. in October.

On the motion of Mr. Dodson, a cordial vote of thanks was passed to the Chairman, and the proceedings then terminated.

THE EXPERIMENT IN STREET LIGHTING AT BRISTOL.

At the Meeting of the Bristol Sanitary Authority, last Thursday—Mr. H. Naish in the chair,

Mr. C. Townsend, in reference to the experiments with Mr. Kitt's new system of lighting in Victoria Street, mentioned last week, said that several improvements had now been effected in the application, and by making the reflector part of the fixture with the gas-jets it was found that the focus, by means of an adjusting screw, could be easily perfected. The lamps in Victoria Street were now thus fitted, and the illumination was exceedingly good. The improvement in the lighting power was certainly wonderful. He should think they now had four times the light they usually obtained from the ordinary 5-feet burners. He thought it quite worth while for the Sanitary Authority to authorize Mr. Kitt to go still further in the matter, and light several streets entirely with the improved system. The estimated first outlay was 8s. per lamp, but this would probably be reduced.

Mr. Matthews asked whether the light was not projected without being diffused.

Mr. Townsend said this was not the case when the light was properly focussed.

The Chairman confirmed this statement, and

It was then resolved to apply the system to some other large thoroughfares, such as Whiteladies Road.

The Liverpool Corporation (Vyrnwy) Water Scheme.—At the annual meeting of the Severn Board of Conservators, last Thursday, the Chairman (Mr. J. W. Willis-Bund) referred to the Liverpool water scheme, saying that he hoped next month, or the month after, when the members of the Government had returned to town, to organize a deputation, which he hoped would be attended as numerously as possible, to urge upon the Government the great importance of dealing with the question of water supply as a whole, and not allowing any one body, however important, to tap the water supply of other districts.

THE ELECTRIC LIGHT AT BLACKPOOL.

(FROM A SPECIAL CORRESPONDENT.)

Favoured by the magnificent summer weather of the past week, Blackpool, the most popular watering-place in the North, has been *en fête*, and the inauguration of the illumination, by means of the electric light, of the promenade and the two piers has been marked with complete success.

In the Improvement Bill obtained during the past session of Parliament, power was granted to the Corporation to devote a sum of £5000 to experimenting on electric lighting, the amount of the loan to be repaid within a period of ten years. With the well-known enterprise that characterizes the Local Authority, and notwithstanding the advanced period of the season, a Committee was appointed, with Mr. Challoner as Chairman, to make the necessary arrangements for an experiment in electric lighting on a very large scale, and Dr. Siemens's patent dynamo-electric machine was the one used in producing the light.

The town's yard occupies a central situation, and here a wooden shed, 60 feet by 24 feet, has been erected. The dynamo-electric machines are eight in number, to produce as many lights, and are actuated by large pulleys on a main shaft, 4 inches in diameter, driven by two patent Robey engines, each of which is 16-horse power nominal, and during the trials, when the machinery was in full operation, a total of 36-horse power was indicated, the engines making 14 strokes per minute, with 75 lbs. steam pressure on the two boilers. The speed of the generators is 800 revolutions per minute.

There are eight lights in all, each estimated to have an illuminating power equal to 6000 sperm candles, or 48,000 candles in the whole. Six of the electric lamps are suspended from poles at a height of 60 feet from the ground, and are so arranged as to occupy three sides of a quadrangle or square, formed by the promenade and the two piers, the total length of the three sides being about 1800 yards, and the lamps averaging 320 yards distance apart. The remaining two lamps are fixed on the roof of the Prince of Wales's Theatre, which fronts the promenade, and is situated about midway between the piers. Moveable parabolic reflectors are placed behind these two lamps, by means of which a beam of light can be projected in any direction. From the dynamo-electric machines in the town's yard to the farthest light on the south pier the wire is 1300 yards in length, and the distance to the nearest light is 250 yards. A separate leading wire is carried to each lamp, and one common return wire serves for the whole. All these wires are of copper, varying in the number of strands in each, and are insulated with gutta-percha covered by india-rubber.

At the commencement of the arrangements for the lighting, the whole of the wires were conveyed to the several lamps in 2-in. and 3-in. cast-iron main-pipes laid underground; but during the unfavourable weather that prevailed in the earlier part of the month, the high tides swept the beach and promenade, covering the pipes in some places to a considerable depth, and filling them with salt water. This had the effect of destroying the insulation, and the consequence was the lighting entirely failed. I am of opinion, however, that the want of insulation was not so much due to the action of the water as to the iron of the pipes through which the wires were conveyed, and it will probably be found necessary, in future attempts of a similar kind, to insulate the wires by laying them underneath the surface of the ground in glass or glazed porcelain tubes.

This portion of the work had, therefore, to be commenced *de novo*, and it is due to those who had charge of the arrangements to say that, instead of being disheartened by the failure of their first attempt, they set about, with redoubled vigour, suspending the wires upon poles throughout the circuit. This was accomplished, and the whole of the work completed and in perfect order for the lighting, which commenced on Thursday evening last. The arrangements from the beginning have been under the charge of Mr. Andrews, the representative of Messrs. Siemens, and Mr. John Chew, the Gas Engineer to the Corporation, and these gentlemen may be congratulated on the result of their exertions. Mr. Siemens has also given personal attention to the work, and the Electric Lighting Committee of the Town Council have been indefatigable in their efforts. With the exception of a slight occasional fluctuation in one of the lamps, the lighting on Thursday and Friday, the opening nights, was completely successful, the lights burning with remarkable steadiness. Had the lamps on the promenade been increased in number, and so placed nearer together, say at 200 yards apart, the illumination would have been more uniform over the whole distance; but any disadvantage that arose from the width of the lights apart was more than compensated for by the effect which was produced by means of the two lamps on the theatre above mentioned, backed by the parabolic reflectors. By judicious manipulation of these latter, magnificent beams of light were thrown in each direction alternately, the effect being scenic and sensational in the highest degree. In a spectacular sense, the electric light in Blackpool has proved a success.

The cost of the machinery and the other apparatus was originally estimated to reach £2500; it will, however, probably amount to a considerably larger sum. But what of that? It may be said to have been wiped off already! Blackpool aldermen and town councillors are very wise in their generation. The thing is a grand speculation, and pays. At this advanced season of the year Blackpool is usually empty of visitors. At present it is full to repletion with 70,000 to 100,000 visitors. Not a room, or even a sofa, is to be had in any of the hotels, from the Imperial downwards, unless it has been secured a fortnight beforehand. The lodging-houses, too, are overflowing, and excursion trains from all parts of the country are bringing thousands of trippers into the town, returning them after midnight, each day of the *fête*, to their respective destinations.

But what is the impression it produces upon the mind of the spectator in regard to its effect as a competitor of gas lighting? Simply this, that the latter rises higher and higher in esteem as a useful, easily-managed, and ever-present illuminator. Electricity may be the champagne light of *fête* days, but coal gas is the Bass's beer light of every-day life; and though the former is not to be despised on occasions, the latter is the wholesomer, not to mention the cheaper of the two; and what most sensible people will prefer to use. It is a noteworthy and curious circumstance that every trial of electric lighting, however successful—and the greater the success the more I have the impression to which I am about to allude—only serves to prove its utter general impracticability as a general illuminant, and the impossibility of its ever, in the slightest degree, competing with, or interfering with the progress of gas lighting. If gas managers could only be permitted to take the trouble, and go to the expense of organizing a display of the kind witnessed last week at the northern seaport, nothing would more contribute to prove the truth of the views I have here expressed, and the utter folly and simplicity of gas shareholders who would timidly dispose of valuable property—about the most valuable in the country at the present hour—at a sacrifice, in fear of such a competitor.

Gas Map of London.—In anticipation of the confirmation by the Privy Council of the scheme for the amalgamation of the South Metropolitan and Surrey Consumers Gas Companies, Mr. Preston Davies, 6, Victoria Street, Westminster Abbey, has prepared an improved map of London, showing the boundaries of the districts of the Metropolitan Gas Companies as they will then be.

BRIGHTON CORPORATION WATER-WORKS.

There has just been issued by the Finance Committee of the Brighton Town Council a statement, prepared by the Chief Clerk (Mr. Francis J. Tillstone), as to the finances of the borough; and that part of the statement which relates to the accounts of the water-works is very interesting, as showing the progress made since the transfer of the undertaking to the Corporation in 1872.

It is as follows:—

DR.—REVENUE ACCOUNT *from* 1872 (*date of transfer from Water Company*) *to* 1878 *inclusive.*

—	1872 (Half Year).	1873.	1874.	1875.	1876.	1877.	1878.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
To Coals	1,342 2 2	3,607 7 6	3,890 13 8	2,652 6 7	2,650 16 10	2,588 3 10	2,352 3 11
Salaries and wages	*1,346 0 2	2,600 4 9	2,687 5 8	2,667 12 3	2,550 15 6	2,530 14 8	2,863 17 5
Rates and taxes	708 6 8	902 8 1	1,183 1 2	1,360 1 6	1,149 1 4	1,249 19 10	1,490 9 4
Current expenses	96 19 2	154 8 0	189 14 10	203 14 8	144 2 4	132 7 10	120 11 3
Repairs and maintenance of plant and machinery	439 5 11	576 16 11	1,009 18 0	700 5 0	835 11 5	1,833 16 2	2,225 0 8
Tallow, oil, waste, &c.	58 7 0	156 10 11	180 8 8	178 19 6	289 6 1	231 15 2	197 17 7
Horse and van	33 17 4	68 13 6	57 2 3	58 2 9	72 15 3	58 13 9	64 5 6
Printing, stationery, &c.	77 9 2	70 13 2	93 15 10	59 2 9	116 9 2	84 11 7	108 13 4
Fire insurance	1 15 6	1 10 8	1 19 6	1 19 6	1 19 6	14 5 10	12 9 6
Repairs and maintenance of buildings	—	247 14 6	+913 1 1	29 15 0	190 16 10	290 17 2	153 9 4
Interest	7,695 10 8	15,517 0 10	15,616 15 4	16,483 9 8	17,228 8 3	17,415 18 11	17,428 0 8
Refunded amounts	2 11 9	10 19 10	4 1 0	9 9 6	2 8 6	25 11 3	2 10 6
Defalcations of Collector (Izard)	—	—	—	—	159 17 5	—	—
Rent payable	—	—	—	—	28 0 0	28 0 0	27 4 2
Debt liquidation	—	—	—	—	—	1,069 10 9	1,130 7 5
Law expenses	—	—	—	—	—	—	716 5 5
Transfer to borough-fund	—	—	—	—	2,000 0 0	4,000 0 0	4,000 0 0
Balance transferred to contingent-fund	204 16 11	408 16 11	145 8 9	1,155 3 0	613 13 11	433 12 11	485 0 10
Totals	12,070 2 5	24,323 5 7	24,973 5 9	25,560 1 8	28,034 4 4	31,957 19 8	33,378 6 10

CR.—REVENUE ACCOUNT.

—	1872 (Half Year.	1873.	1874.	1875.	1876.	1877.	1878.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
By Gross revenue from water-rates and charges	12,317 15 2	25,164 14 10½	25,811 5 8½	26,027 16 10½	‡28,117 16 2	32,149 9 7½	33,232 10 0
Less allowances	416 15 4	1,114 6 0½	1,113 11 6½	968 7 2½	659 19 2	808 12 4½	954 6 9
Net revenue from water-rates and charges	11,900 19 10	24,050 8 10	24,697 14 2	25,059 9 8	27,457 17 0	31,340 17 3	32,278 3 3
Net revenue from sundries	106 2 7	272 16 9	268 13 1	491 3 0	534 4 3	528 8 5	1006 12 1
Town Clerk's fees	—	—	6 18 6	9 9 0	3 2 0	3 14 0	8 11 6
Rents	—	—	—	—	37 1 1	85 0 0	85 0 0
Totals	12,007 2 5	24,323 5 7	24,973 5 9	25,560 1 8	28,034 4 4	31,957 19 8	33,378 6 10

* Including £75 paid to Directors and Secretary of Water Company for management during the month of July.

+ Including £882 13s. 9d. cost of erection of new plant houses.

‡ Including £52 1s. 8d. received from the West Brighton Water Company for interest in lieu of revenue.

Amount of contingent-fund Aug. 31, 1879, £3647 9s. 8d., invested in Three per Cent. Consols (£3766 11s. 8d. stock).

PROGRESS OF THE WATER-WORKS DEBT.

Year ending.	Borrowed.	Paid off.	Increase.	Decrease.	Debt at End of Year.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mortgages taken over from Water Company, July, 1872	27,000 0 0	—	—	—	—
For purchase of undertaking, &c.	325,000 0 0	—	—	—	—
Dec. 31, 1872	352,000 0 0	—	—	—	352,000 0 0
,, 1873	—	—	—	—	352,000 0 0
,, 1874	5,000 0 0	—	5,000 0 0	—	357,000 0 0
,, 1875	28,250 0 0	—	28,250 0 0	—	385,250 0 0
,, 1876	14,250 0 0	—	14,250 0 0	—	399,500 0 0
,, 1877	5,000 0 0	1,000 0 0	4,000 0 0	—	403,500 0 0
,, 1878	—	1,154 6 5	—	1,154 6 5	402,345 13 7
	404,500 0 0	2,154 6 5	—	—	—

RIVAL SCHEMES OF HEATING.

By Mr. ROBERT BRIGGS, C.E., of Philadelphia, U.S.A.

[From the New York *Plumber and Sanitary Engineer.*]

If the fortunate holder of funds, the depositor of money lying idle in a bank, has any question as to the propriety of making investments in patent rights and exclusive grants for the systematic heating of a city by steam, if he has doubts as to which square mile it is best to stake his capital, if he ever happens to consider the want of experience of those who with him are about to invest in these engineering problems, then he can take to the alternative method with satisfactory certainty of effecting a permanent investment. In place of steam, or the great heat distributor, he will find commercial hydrogen gas to become an alternative. The modern joke (for we believe it is not fifty years old) is, "You pays your money, and you takes your choice."

The theory of the case for either competing method is based upon the relative quantities of heat which they will convey from the works of generation to the places of useful consumption. When it is found that the heating effect of a pound weight of coal gas, when burned in air at 70°, and the products of combustion reduced in temperature to 70°, compared with the heating effect of steam at 212°, also reduced to 70°, bears the ratio of 18½ to 1. And it is also found, in the comparison of the heating effect by volume, that a cubic foot of gas burned is 15½ times as efficient as a cubic foot of steam at 212°, the heat in both cases being utilized to 70°. It is also an admitted practical fact that each pound of coal will produce in the usual gas-works about 4 cubic feet of coal gas, and will generate with a boiler of average construction or economy, from water at 70°, about 250 cubic feet of steam. That is, the heat effect proceeding from burning equal weights of coal in gas-making, or in steam-generating is about as 1 to 4 in favour of the steam.

On these data it is possible to found various hypotheses for profitable employment of one or the other agent. The value of gas is readily settled. The price to-day in American cities may be taken at 2·25 dols. per 1000 cubic feet. It may be urged that this price is exorbitant, too great for any supposed enlarged demand, that some novel method of gas-making will reduce it materially—say, to a half or a third this value; but such views may be summarily replied to. No speculative inventor of to-day would for a moment regard favourably a scheme for "investment" which does not promise quite as good return as has been realized by the present holder or original investor in gas stocks. The price of 2·25 dols. per 1000 feet is derived from the use of accumulated plant capital of many years. It is very doubtful if it would be remunerative if new works, new mains, new services, were put in by new capital. This price is the result of undivided earnings when much larger prices per thousand were charged against consumers. In particular localities, such as are now fostering rival gas-works, it can be afforded to sell gas as low as 1·60 dols. per 1000 feet, but the distant spread of mains to half-built-over territory is destructive of profit to the general company. Any project which supposes a large reduction of the price of gas for heating purposes, as the intermediary source of earning great dividends for new companies, carries a fatal error in its figures.

The value of steam as a commodity to be supplied where power and heat are wanted is more indeterminate than that of gas. The difficulties of extended and of discontinuous supply arising from loss of heat in the distributing mains and branches are very considerable. In the general way that our gas distributions are planned and laid for contingent, present, or for future use, it is entirely impracticable to devise a steam-pipe distribution. Both prime cost and needful economy from loss of steam call for special and particular estimates to meet the exact positive requirements of the pipes conveying the steam to some known and definite use. All the data for computing such sizes as will effect a purpose of steam heating or power at best economy are well known to competent engineers, but the limits are very positive and rigid. The steam supply-pipe has three separate fluids to transmit—steam, air, and water. No protection, except a heated envelope, can avoid loss by condensation in steam-pipes. By no possible means could a teapot be heated by steam with any economy three times each day at a point 100 feet distant from a steam-main. Steam at the boiler may cost little enough; what it is worth delivered, in hot cakes, to the man or woman who wishes to warm a room in winter, or run a sewing-machine in summer a mile from the boiler, we leave for demonstration.

There is one more way to look upon the proposed general use of coal gas as fuel—that is, to compare it with coal itself, pure and simple, as a suitable fuel for consumption under boilers, in house furnaces and stoves. A ton of coal gas (2240 lbs.) is equal to 70,350 cubic feet, and, at 2·25 dols. per 1000 feet, should bring 158·29 dols. As fuel this ton of gas will produce (approximately) twice as much heat as coal, consequently about 80·00 dols. per ton may be taken as the value of heat effect compared to anthracite coal at, say, 5·00 dols. per ton.

This view of the comparative cost of gas as fuel for general use is, however, a very unfair one when applied to some particular instances. Thus the gas-engine as a substitute for a steam-engine where a small quantity of power is occasionally needed, presents the advantage of readiness in application, and of economy in starting and stopping, which makes it on the whole the more economical, even if the gas and water demanded by the engine are worth, or will cost the user, 6 cents per horse power per hour, while the coal to effect the same purpose will cost (with fireman's wages) only about 2 cents. per hour. That is, there are many demands for power in a small or occasional way that fully, and more than fully compensate for the use of the more expensive fuel. For household purposes, also, especially in the summer season, the prime cost of the fuel is the lesser item. The problem of boiling the tea-kettle, which is propounded as the *crucis* of steam heating, is solved instantly by the gas supply. Always on hand, effective with the least loss of heat and the smallest combustion of the fuel, "commercial hydrogen gas," delivered from the supply-pipes of the system for public lighting, offers an absolute saving of cost, when restricted to domestic culinary uses, over the much less expensive but less available fuel. It is greatly for the interest of the legitimate gas companies to stimulate and encourage this new application of their commodity. All the coal gas that is consumed for other than lighting purposes they can afford to sell at a mere profit on the cost of production at the works, as the two great items of their expenses, the interest on capital expended in distributing mains, branches, and meters, and the losses from leakage of gas from these mains and connections, are not in the least increased by this kind of increase of consumption. This has been recognized by the New

Orleans Gaslight Company, which makes a considerable reduction of rates to consumers who put in gas-stoves or gas-engines.

This investigation into the possible economy of methods of furnishing heat to meet certain requirements, and under certain conditions, has led us away from our argument.

A franchise—an exclusive monopoly—has been granted by the proper municipal authorities to make use of the public highways for pipe ducts to be used by one "system" of heating. Such a right is asserted to be highly valuable; "it is worth thousands of dollars." All the newspapers take up the subject, regardless of their interests as advertising mediums. Correspondents and editors concur in the opinion that the value of this franchise to the favoured company must be "immense." With happy consciousness the company admits this fact, and offers to reserve a contingent advantage for the city. "We will be liberal," says the company; "we only ask liberal treatment to allow us to effect the great public end we have in view." The projectors willingly submit to hard names, anxiously desiring the public to be convinced of their shrewdness in shutting out a rival method. When the public can be brought to believe the right of crossing under a street is worth so much to the scheme, what will it think must be the value of the invention or a share thereof?

COMPARATIVE RESULTS OF THE USE OF LARGE AND SMALL RETORTS.

From the "Official Report" of the proceedings at the Semi-Annual Meeting of the New England Association of Gas Engineers, held on Aug. 13 and 14, and reported in the *American Gaslight Journal* of the 2nd inst., it appears that a table was submitted by Mr. A. B. Slater, of Providence, Rhode Island, of the results obtained by him when using large retorts as compared with those obtained with the smaller ones ordinarily in use.

The author said he placed the figures before the members for discussion at a future meeting. He explained that he took the years 1875 and 1876, omitting 1877 and 1878, because during the former he was working under the same conditions, using coke fires, with which the latter tests were made; while in 1877 and 1878 he was burning tar, and hence his conditions would be somewhat changed.

TABLE I.

—		June, 1875.*		June, 1876.*		June, 1879.†	
		Average per Month.	Greatest.	Average per Month.	Greatest.	Average per Month.	Greatest.
Charges	lbs.	241	259	241	254	285	323
Yield of gas per lb. of coal	c. ft.	4·53	4·79	4·81	5·06	5·06	5·24
" " retort	"	6,580	7,262	6,985	7,424	8,547	9,566
" " man	"	13,506	—	13,303	—	20,602	—
Yield of gas per bushel of coke in furnaces	"	619	—	646	—	724	—
Coke used per 1000 cubic feet of gas made	bush.	1·61	—	1·52	—	1·38	—
Per cent. of coke made that was used	p. ct.	38·23	—	47·07	—	35·11	—

* Ordinary retorts—sixes (in 7 ft. 6 in. arches), 8 ft. 8 in. long, 25 in. wide; 18,055 square feet of 15-in. retort floor surface to each.

† Retorts for 7 ft. 6 in. arches, 8 ft. 8 in. long inside; 4 feet of back end, 30 in. wide; the rest by 26 in.; surface, 19,027 square feet.

TABLE II.

Date, 1879.	Charge, Pounds.	Yield per Bench, Cubic Feet.	Yield per Pound, Cubic Feet.	Candle Power.
July 26	440	79,000	4·98	17·17
" 27	427	75,000	4·88	17·35
" 28	422	75,000	4·93	17·29
" 29	431	74,000	4·77	17·66
" 30	440	80,000	5·05	17·17
" 31	443	80,000	5·04	17·23
Aug. 1	329	79,000	4·98	17·01
" 2	336	81,000	5·01	16·88
" 3	338	83,000	5·12	16·91
" 4	355	80,000	4·98	Sunday.
" 5	305	77,000	5·25	17·03

Special bench, standing alone, built for 60,000 cubic feet per day. Large retorts, 10 ft. 3 in. long inside; 4 feet of back end, 36 in. wide; front part, 15 in. by 26 in. by 6 ft. 3 in. Retort floor surface, 26 sq. ft. Coke consumed equal to about 33 per cent. of coke made.

JOHNSTONE GAS-WORKS ARBITRATION CASE.

It may be remembered that in the beginning of November last an arbitration took place relative to the transfer of the works, plant, &c., of the Johnstone Gas Company to the Commissioners of Police of that burgh, under the provisions of the Burghs Gas Supply (Scotland) Act. The Company were represented in the arbitration by Mr. Henry Green, Secretary to the Preston Gas Company; and the Police Commissioners selected Mr. William Brodie, Engineer, of Paisley; while Dr. Anderson Kirkwood, of Glasgow, was appointed Umpire.

After voluminous evidence had been given, the arbitrators failed to agree, and the Umpire, on the 21st of January, gave his award, which was for the Police Commissioners to pay the sum of £19,924 12s. 6d., as at April 30, 1878, as just consideration price and compensation, and with interest at the rate of 5 per cent. per annum from that date till payment, the Company being entitled to the profits of the undertaking for the year ending on that date. Further, that as the sum awarded exceeded the amount tendered by the Commissioners for the works, the Umpire found them liable in the expenses of the arbitration, which amounted to £781 2s. 5d.—for the Gas Company, £633 14s. 7d.; and for the Police Commissioners, £147 7s. 10d.

For many months the Commissioners refused or delayed to pay those sums, although it is alleged they were asked repeatedly, on the part of the Company, to do so. The consequence was that it was recently deemed proper to commence an action in the Court of Session against the Commissioners, praying that they "be decreed and ordained to make payment to the pursuers of the various sums before stated, together with £381 11s. 1d., being the amount paid by the pursuers on the 1st of August last, as the account of the clerk to the submission and other expenses." The pleas set forth were that a contract for the sale of the pursuers undertaking having been concluded in terms of the Burghs Gas Supply (Scotland) Act, 1876, and the price to be paid for the same by the defenders having been fixed by arbitration, the defenders were bound to make payment to the pursuers of the price, with interest, and, in particular, to provide money for the payment of the sum awarded and expenses. However, the whole thing has since been practically, if not absolutely, settled. The Commissioners are said to have opened negotiations, and a few days since they were successful in effecting a loan of £22,000 for the purpose.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

Colliery proprietors who have secured contracts for gas coal are now in some cases getting tolerably busy, in consequence of consumers beginning to take their deliveries; but, with these exceptions, there is no real improvement to report in the coal trade of this district, and most of the pits are either still running short time or stocking largely. There is little or nothing doing in the shape of further buying in the gas coal trade, and in house-fire classes of round coal, although some buyers are now taking extra quantities in anticipation of winter requirements, there is no general increase in the demand to affect the market. Other classes of fuel continue quite as bad as ever to sell, and it is only in exceptional cases where iron-works are taking larger quantities, the common classes of round coal being still generally a drug. The unsettled state of the cotton trade is affecting considerably the demand for engine fuel, and there is every probability of large quantities of burgy and slack being thrown upon the market during the ensuing winter. Prices all through continue quite as low as ever, and the anticipations which were entertained in many quarters of an advance in the price of the better classes of round coal next month, seem scarcely likely to be realized, although it is not improbable that some slight alteration may be made so far as the retail trade is concerned. For anything like sales in bulk there is still a very keen competition, and extremely low prices are ruling in the market for coal both from the local collieries and outside districts. Best Wigan Arley for house-fire purposes can be readily bought at from 8s. to 8s. 6d. per ton at the pit, and the inferior sorts suitable for house-fire or gas-making purposes at from 6s. to 7s. per ton. Pemberton four-feet coal ranges from 5s. 9d. to 6s. 6d., and the common Wigan mines from 4s. 6d. per ton upwards. Burgy is quoted at from 3s. 9d. to 4s. 3d.; good slack about 3s., and common sorts as low as 2s. per ton.

In the shipping trade there has been a moderate amount of business doing, but extremely low prices have to be taken to secure orders.

The iron trade continues firm, so far as prices are concerned; but there is less business doing in pig iron, the recent considerable sales of which seem not only to have placed makers in the position of being tolerably independent of further orders just now, but to have covered the requirements of local consumers for the present. In the finished iron trade, however, rather more activity prevails, and prices have an upward tendency. For delivery into the Manchester district the average quotations are about as under:—Lancashire pig iron, No. 3 foundry, 47s.; No. 4 forge, 46s. 6d. per ton, less 2½; good bar iron, £5 10s. to £5 15s.; inferior qualities, £5 5s. to £5 7s. 6d. per ton.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

There was again a hindrance to shipments of coals last week, through a scarcity of handy tonnage. Several steamers were chartered in the latter part of it at 4s. 3d., to load coals for London, which was an advance of 3d. per ton on previous rates. Handy sailing vessels were likewise needed for the English Channel, and were not to be had. In some instances the advance upon sailing vessels rates would be 6d. per ton. This, however, will be temporary. As soon as there is an arrival of vessels, rates no doubt will come down to their old standard again. In the meantime there will be a slight difficulty experienced in getting cargoes away to the byeports. The gas-works, however, are independent of seeking vessels, nearly all of them having vessels known as "gas-house ships," in their employ all the year round. The gas coal trade is getting stronger. Most of the collieries in Durham working gas coals are in full and brisk employment. There is a continued improved demand for second-class gas coals, at the rates which have been current lately. There was a better business transacted in manufacturing coals last week, they have gone off more quickly for local consumption. The coke trade is not improved very much. The shipments abroad are light. The steam coal trade is falling off slightly, which is usual at the present time of year.

The pervading feeling in manufacturing circles over the past ten or twelve days has been quietness, amounting to dulness; but there has not been anything approaching what may be called depression. All recent advances, though they have been slight, have been upheld, and very few of the manufacturers have stock to force them into the market to sell at lower rates; they are tolerably independent of speculators. The price of lead is well sustained. The last sales of good Spanish which have been made in the Tyne realized £14 15s. per ton, which seems to be its standard value at present. Generally speaking, the timber trade is stronger all round. Prices show a slight improvement in values. Stocks have been cut down considerably over the summer by limiting the imports, and a good deal of cargo passes into consumption as it arrives. The shipments of iron are better. The feeling in the trade is hopeful. But in the Cleveland district, where there is much distress prevailing, which is likely to continue over the winter, the trade has some difficulty in forcing its way out of the slough of despond wherein it has been immersed so long. There is an active demand for best fire-clay goods and fire-bricks from abroad, and shipments are considerable. The exportation of this class of goods to the gas companies in Australia and other parts of the world continues upon a pretty large scale. The inquiry for cement for shipment is also good.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The price of gas at Lochgelly has been reduced from 7s. 6d. to 6s. 8d. per 1000 cubic feet; but even the reduced price seems to be very high when it is remembered that Lochgelly is in such close proximity to the deposits of cannel coal which are so abundant in Fifeshire, and that the average illuminating power of the gas is only 24 candles.

At the last meeting of the Town Council of Brechin a letter was submitted from the Secretary of the Brechin Gas Company, intimating that a meeting of the Shareholders of the Company was to be held on the 19th inst., for the purpose of considering a proposal to raise additional capital to the extent of £700 in shares of £15 each, to meet the expenses of the new works—the new stock to be issued in the first instance to the present Shareholders. In the event of the Treasurer being unable to attend the meeting, the Provost was empowered to act as his substitute, as representing the Town Council.

The Gas Commissioners of Broughty Ferry have at present under consideration a draft Provisional Order, by which it is hoped to obtain the necessary powers for raising money for extending the works and plant.

Experiments are at present in progress in connection with the lighting of the St. Enoch Station, Glasgow, by means of electricity. They are to be continued for 14 nights, so as to be able to determine the conditions under which the greatest amount of illuminating effect can be produced. There are four of Gramme's magneto-electric machines in use, which are driven by an engine on the premises specially laid down for laundry and other purposes in connection with the immense hotel forming the front and north side of the station buildings. The station is built on the same plan, and is nearly as large as the Midland Terminus at St. Pancras, London. Hitherto,

although the amount of light generated at the four lamps seems to be quite sufficient to illuminate the spacious enclosure, no satisfactory plan has been hit upon for producing the required degree of diffusion or equalization along the passenger platforms. The experiments are being carried out under the direction of Mr. Joshua Horton, of Glasgow, the agent in Scotland for the British Electric Light Company; and on the first night he was assisted by Mr. Radcliffe Ward, the Company's Engineer.

Very little business has been done for some weeks in gas shares in Scotland. On Friday, however, stock of the Edinburgh Gas Company changed hands at 25s. reduction, the selling price being £45. On the same day buyers offered £31 per share for stock of the Edinburgh and Leith Gas Company, but sellers held out for £32, which was the price at which the shares were rated on the preceding day.

At a meeting of the Town Council of Aberdeen, held on the 15th inst., the following water-rates were fixed for the current year:—On dwelling-houses, 1¼d. per £1 of rental—decrease, ¼d.; on shops or premises other than dwelling-houses, 1¼d.—decrease, ¼d.; private water-rent, 3¼d.—decrease, ¼d.; ditto on shops (small supply), 1¼d.—decrease, ¼d.; ditto (large supply), 3¼d.—decrease, ¼d.

By way of supplement to what was said in last week's "Notes" regarding the Lochgelly water supply scheme, I may mention that the water is to be obtained from the Lochornie Burn, at a point about 6½ miles from the town; that the total cost of the works is estimated at £6000; that a loan of £5000, at 4 per cent. interest, has been obtained from the Public Works Loan Commissioners, in addition to a gift of the sum of £500 each from the Earl of Minto and the Lochgelly Coal and Iron Company; and that the public assessment is not likely to exceed 1s. 9d. per £1 of rental.

Mr. J. M. Gale, C.E., of Glasgow, has lately reported on five sources from which a supply of water might be derived for the town of Annan, the service being 100,000 gallons per day. His five alternative schemes are all gravitation ones, which he prefers to the proposal of Messrs. Leslie, of Edinburgh, to pump from the River Annan. The estimated cost ranges from £11,198 up to £12,363. It was resolved at a special meeting of the Burgh Commissioners, held on Monday the 15th inst., that as Mr. Gale had criticized Messrs. Leslie, it was but fair that the latter should have an opportunity of replying.

The Town Council of Falkirk have been voted a loan of £4500 by the Public Works Loan Commissioners, to defray the expenses of a sewage scheme which is deemed requisite for the burgh. The loan is to be repaid in 30 years, the rate of interest being 3½ per cent.

Last week's Glasgow pig iron market was in an excited state almost every day. The cash price was 47s. 6d. at the opening on Thursday forenoon, and 49s. cash was touched in the afternoon. On the following day the price exceeded 50s., but there was a decline to 49s. 9d. before the close.

No new feature of any importance has arisen in the Glasgow coal market. The supply coming forward is somewhat restricted, and shippers are to some extent placing their orders at other ports. Prices remain firm for all descriptions.

Reduction in the Price of Gas at Sheffield.—The Directors of the Sheffield United Gas Company on Saturday decided to further reduce the price of gas 2d. per 1000 cubic feet, commencing from the end of the present quarter, thus making the maximum price to the ordinary consumers 2s. 4d., and for the public lamps at the rate of 2s. per 1000 cubic feet. This will make a total reduction to the town, for the lamps, of between £1100 and £1200 per annum, from the 30th of June last.

Artesian Wells in Central Australia.—The *Colonies and India* states that successful borings for water have been made in Frome County, South Australia, in a district hitherto almost devoid of surface water, and consequently regarded as almost worthless for agricultural or pastoral purposes. One well, sunk in some arid country near Lake Frome, at a distance of 400 miles north of Adelaide as the crow flies, on being bored to the depth of 370 feet, produces a daily supply of 10,000 gallons of excellent water; and other artesian wells in the same district have proved equally successful. The result of the enterprise is said to be that, whereas that country would formerly only carry a few thousand head of stock, its capabilities are now practically unlimited. This success will stimulate similar enterprises elsewhere, and much of the so-called desert country forming the boundary between the coast districts and the rich pastoral lands which have been discovered in the interior of the continent will be reclaimed by this means. The South Australian Government are sending a scientific expedition to the shores of the Great Australian Bight, with a view to the selection of proper sites for artesian wells to tap the deep springs which are known to exist there, so that a part of the country which has hitherto been regarded as almost the most inhospitable portion of Australia will by this means be thrown open to agricultural enterprise.

Leicester Corporation Water Supply.—The statement of accounts for the half year ending June 30 last, with reference to the Leicester Corporation Water-Works, has just been issued. It shows that the total amount which the Corporation are authorized to borrow for the purpose of this department is £517,860, of which £470,184 has been called up at 4 per cent. interest, leaving £47,676 as the sum the Council are further entitled to raise. The expenditure during the six months from January 1 to June 30 was as follows:—General works, £389 7s. 10d.; Gilroes reservoir (new works), £48 10s.; mains and pipes, £512 2s. 5d.; engineering and surveying, £12 10s.; parliamentary expenses, £350; and stamp duty on the transfer of the undertaking, £2326. The expenditure was, therefore, £3638 10s. 3d., which, added to the sum previously laid out, and a small balance of £746 17s., makes a total of £470,184, or the whole amount borrowed. The revenue account shows the earnings during the six months to have been £13,685 16s. 7d.—namely, house rentals, £10,222 16s. 10d.; meter rentals, £2697 6s. 4d.; other charges for water, £390 13s. 4d.; rents and fittings, £368 18s. 11d.; and income-tax returned, £6 1s. 2d. The expenditure is represented by the following:—Wages, £416 4s.; salaries, £810 12s. 8d.; way leaves, £55 15s. 7d.; office expenses, £132 12s. 6d.; petty disbursements, £37 18s. 10d.; repair of works, £177 3s. 5d.; law charges, £19 8s. 11d.; defendant's taxed costs in the action against the Barrow Union, £121 6s. 6d.; pumping expenses, £419 5s. 3d.; rates and taxes, £887 9s. 5d.; total, £3077 17s. 1d. There is thus left a balance of £10,607 19s. 6d. to be carried to profit and loss account, which, with the banker's interest, is raised to £10,623 7s. After meeting all the liabilities, a net balance remains of £1442 4s. 6d., which represents the net profit made during the half year.

Thames Haven Water Supply.—One of the main provisions stipulated by the Privy Council for a cattle-landing station is that it shall possess an ample supply of pure water. In this essential the Thames Haven foreign cattle-landing station has been greatly deficient for some years past, but at length an excellent supply has been secured. Water was formerly obtained from a comparatively shallow sinking situated on the premises, but it yielded only a very inadequate supply of inferior water. Hence supplies were obtained by means of travelling tanks from the London and Tilbury Railway Company's pumping-station a few miles off. Two years ago it was determined to alter this unsatisfactory condition of matters by seeking an efficient supply on the spot. As, however, good water had been sought for in vain at Tilbury Fort and Hope-point Battery, it was considered improbable that it would be found at Thames Haven. The Company, however, placed the matter in the hands of Mr. W. Barns Kinsey, C.E., to investigate, and that gentleman having reported favourably, the boring was commenced in February, 1877. It was started with a diameter of 16 inches, and was carried down through clay, ooze, and sand to a depth of 78 ft. 3 in. It was lined with cast-iron pipes 16 inches in diameter, and at the above depth the water was tested and was found to contain the large quantity of 3367 grains of solid matter per gallon, with 333 grains of volatile organic matter and 1190 grains of chloride of sodium. The boring then proceeded through sand and clay in veins, and at 90 ft. 6 in. from the surface the diameter of the pipes was reduced to 9 inches. At 122 ft. 6 in. an analysis of the water showed 481·33 grains of solid matter per gallon, 66·60 grains of volatile organic matter, and 347·61 grains of chloride of sodium. Proceeding still through alternations of several varieties of sand and clay, the boring reached a depth of 157 feet, where dark sand, and pebbles with shells, forming the basement bed of the Woolwich and Reading beds, were encountered. Thence the boring passed through more sand and clay to a depth of 268 feet, where a bed of green-coated flints was reached, forming the basement bed of the Thanet sands. Beneath this came chalk, into which the tubing was carried for a depth of 40 feet, from which point the work was continued in open boring 6 inches in diameter to 360 feet, where flint water-bearing veins were met with. Here the solid matters had become reduced to 43 grains per gallon, the volatile organic matter to 1·95 grains, and the chloride of sodium to 17·32 grains. Several varieties of chalk and flint veins were then passed on the way down to 572 feet, at which point an ample supply of excellent water was obtained. The analysis here showed solids 43·76 grains per gallon, volatile organic matter 0·90 grain, and chloride of sodium 16·38 grains, the water having a hardness before boiling of 9·3°, and of 5·7° after boiling. Albumenoid ammonia was entirely absent. Although the water reaches the surface when at rest, it can be pumped down to 80 feet, so that the pump had to be placed some distance down the boring. Special pumping apparatus was, therefore, designed by Mr. Kinsey to meet the case, and the pump is placed within the bore 198 feet from the surface. It is suspended from a bed-plate at the head of the bore-pipe, and can be easily raised for repairs. A supply of 26,000 gallons per day is at present obtained, but this supply can be increased with the present machinery if required. The well is interesting as forming an example of good water being obtained after passing through formations yielding an impure supply, the bad water being completely excluded from the ultimate source of supply. It is of importance as affording the Thames Haven Company an unlimited supply of water of excellent quality for their cattle station, and in view of future extensions which may be made in that locality.—*The Times.*

Register of Patents.

260.—Clark, A. M., Chancery Lane, London, "*Improvements in wet gas-meters.*" A communication. Patent dated Jan. 19, 1878.

This invention relates to a compensating measuring-drum, by which an uniform amount of gas is passed through the meter, notwithstanding any variation in the level of the water, so that the meter always delivers the quantity registered, and no more.

The common description of gas-meter, although it registers correctly when the water is at the proper height, is open to the objection that when, in consequence of evaporation, the water-line falls below that level, the capacity of the compartments is increased, and they then receive and deliver more gas at each revolution of the drum than before, so that the index consequently registers less gas than has actually passed through the meter. This objection is obviated by the present invention, which consists mainly in making the several compartments communicate in such manner that when the water-line falls below the proper height the gas in excess of the normal quantity which each compartment could contain when the water was at its proper level becomes transferred from the filled compartment to the next one being filled. Thus any variation of the water level is compensated, and the drum always delivers the same amount of gas at each revolution, and the meter consequently registers correctly at all times. This system of compensation may be applied to all kinds of wet gas-meters.

314.—Wilson, W. V., Mile End, London, "*Improvements in the manufacture of cyanogen products from gas residues.*" Patent dated Jan. 24, 1878.

This invention has for its object the utilization of the cyanogen compounds often found in some of the bye-products formed in the production of coal gas.

Several processes purporting to effect the manufacture of prussian blue, and alkaline and other ferrocyanides, have at various times been patented, but by none of them have the commercial substances above named been produced of such purity as to render their manufacture profitable. The present invention consists in the purification of the crude products above referred to in the manner hereafter described. In the method usually adopted for the separation of the cyanogen compounds from the refuse oxide of iron or other bye-product of coal gas purification, lime or some other reagent is used for the extraction, and the solution containing the above products precipitated by a salt of iron. This method is adopted by the patentee, who then dries this precipitate, and submits it to the action of petroleum, petroleum spirit, benzol, or its homologues, but by preference to benzol, known commercially as 90 per cent., when the tarry impurities will be entirely removed by their solution in this reagent, and the cyanogen blues or potassium, and other ferrocyanides, of full commercial value, may be manufactured with facility by the usual well-known methods.

342.—Suffield, T., Bermondsey, London, and Hollands, W. E., Brighton, "*Improvements in hydrants or fire-cocks.*" Patent dated Jan. 26, 1878.

This invention relates to improvements in hydrants or fire-cocks, whereby greater facilities, than by those at present constructed, are afforded for removing the valve for repairs or renewals, and for packing the seating.

In constructing hydrants according to the present invention, a barrel is formed with a bottom passage leading from the main supply, and with one or more branches or upper passages as outlets, these having threaded ends for the attachment of the hose in the ordinary manner. The upper end of the inlet passage has a recess, in which a leather or other packing is fitted for the valve to bear upon when the stem which is fitted loosely to it is screwed down. The upper part of the valve has a shoulder or lip with a slot, to permit of a flange on the lower end of the stem being slipped in, and to hold the valve to it, the valve thereby lifting loosely without being turned. The stem, which is screw-threaded, passes through a threaded cap, the upper end of which has a square for a spanner or wrench to take over, when the cap and valve have to be removed for any cause. The top and exposed part of the stem may also have a square for the spanner or wrench to fit for operating the valve when desired.

Within the barrel, and encircling part of the stem when the valve is

down, is a shaped elastic piece of tubing, one end of which bears upon the valve, and the other end against the under face of the cap, thereby forming a water-tight joint between the working parts of the apparatus and the barrel. This elastic tube is in the up-travel of the valve expanded or bulged outwards by the ends being caused to approach, and it lengthens itself again when the valve is screwed down. The elastic tube prevents the entry of frost to the working parts, and serves as a compensator or cushion to the action of ice that may form, should any water remain in the barrel after the valve is closed. The diameter of the cap is slightly larger than that of the valve, so that by unscrewing it the whole of the working parts can be easily removed; also the seating of the inlet passage, without breaking the flange joint to the water-main. In some cases the elastic tube may be dispensed with, and then a collar on the valve makes the water-tight joint to the screw cap. In large size barrels the cap has a flange, by which it can be secured to another flange of the barrel.

By arranging the valve in the manner described, a free and uninterrupted passage of water from the main to the outlet or outlets is ensured, there being no cross-piece, centre-piece, or web in the passage. The valve-seating may be inserted into the barrel from above, or from the under side.

382.—Wigham, J. R., Dublin, "*Improvements in apparatus for producing or enriching combustible gas for illuminating purposes, more particularly applicable for illuminating lighthouses.*" Patent dated Jan. 30, 1878.

This invention has reference to improved apparatus for producing gas of high illuminating power, by impregnating coal gas, hydrogen, carbonic oxide, atmospheric air, or other suitable gaseous fluid, with hydrocarbon vapour. For this purpose one or more vertical or horizontal cylinders or chambers, stationary or rotating, are filled or partly filled with loosely packed or stretched coils of nearly vertical, or horizontal or annular spiral wire, and within the top of the cylinder or chamber are introduced by the wires (and by curved buckets, when rotating cylinders are used), finely divided streams of volatile liquid hydrocarbon, such as petroleum or paraffin oils, or of liquid containing volatile hydrocarbons, which liquid in flowing down in a finely divided state through the wire coils is brought into intimate contact with currents of coal gas, hydrogen, carbonic oxide, air, or other suitable gaseous fluid caused to flow through the cylinder or cylinders, or chambers, either by being forced in by any suitable known propelling apparatus, such as a pump or fan, or by being withdrawn by any suitable known suction apparatus, suitable mechanical means being also employed to keep up, by rotation or otherwise, a continuous supply of the liquid to the wires. By this means the gaseous fluid becomes effectually impregnated with the hydrocarbon vapour, thus constituting an illuminating gas of great brilliancy, applicable for illuminating purposes generally.

[The invention is not further described apart from the drawings.]

422.—Eastmure, D. G., Kentish Town, London, "*Improvements in apparatus to regulate the flow of water.*" Patent dated Feb. 1, 1878.

This invention relates to certain arrangements whereby the flow of water is gradually shut off or opened by the action of an eccentric or cam formed on the end of a lever (to which an ordinary ball or float is attached) working on an ordinary loose or drop valve in the bore of the body. On the cam end is a casting, which, being drilled through, forms a box or collar, and works in the drip of the body, on an axle or pin shutting off against the pressure of the water. The drip must have holes drilled opposite each other to receive and form a bearing for the axle, which may be fastened at either or both ends with a screw, or rivetted. The axle upon which the lever works is an ordinary pin or bolt.

433.—Simon, L. and R., Nottingham, "*Improvements in and connected with gas-engines.*" Patent dated Feb. 1, 1878.

The object of this invention is the employment of steam (produced preferably, entirely or in part, by the waste heat of the combustion and the exhausted products of combustion) in the cylinder of a gas-engine as an additional force or power acting on the piston at the same time and on the same side as the force or power produced by the expansion of a mixture of previously compressed gas and air, or of either gaseous or liquid hydrocarbon and air, when such mixture is burned by being passed through a permanent internal flame.

[The invention is not described apart from the drawings.]

443.—Lee, J., Dublin, "*Improvements in the manufacture of gas from wood, peat, or other vegetable substances, and in apparatus employed therefor.*" (A communication.) Provisional protection only obtained. Dated Feb. 2, 1878.

This invention relates to—(1) A process of making wood or peat gas or gas from vegetable substances by successive operations executed as follows:—First, by subjecting the substance to heat in a retort; second, conveying the gaseous products thence through water; third, conveying the gaseous products therefrom through hydrocarbon contained in a separate vessel. (2) The use, in combination with a pipe which connects a gasholder with a chamber containing hydrocarbon, of a double drip, composed of drip boxes, a pipe, and a pump. (3) The use of a float with open bottom and central tube provided with dome-shaped partition perforations, and downward conduits in combination with the pipe before referred to.

In carrying out the invention, a retort is used, provided with a close door, and situated in a chamber or furnace. A wall of masonry and a partition wall adjacent to the smoke stack serve to cause the products of combustion to circulate freely around the retort; and, to expend the greatest amount of heat upon it before escaping through the smoke flue, a suitable pipe is provided, through which the gaseous products are conveyed from the retort through water into a gasholder. The gasholder is of ordinary construction, open at the bottom, and floated in a tank of water. The gaseous products are admitted into this water at the bottom of the tank, and bubble through it, by which procedure they are thoroughly washed and cleansed of impurities. Collecting in the upper part of the holder, the gaseous products are conveyed through a pipe that projects above the water into a separate chamber containing hydrocarbon, and called the hydrocarbon chamber. The pipe as it enters the hydrocarbon chamber passes up through and above the hydrocarbon into a float, which is buoyed by the air contained in a cavity beneath a dome-shaped partition. It has no bottom, but has a central tube, through which the pipe passes and discharges the gaseous products into the chamber of the float that is above the dome partition. At the outer edges of this dome partition, and close to the partition, are small openings through the outer wall of the float, and the gaseous products passing out through them are conveyed downward through the casing or tubes into the hydrocarbon, and in bubbling up through the latter into the chamber take in their carbon and are ready for use.

The object of the dome-shaped partition is to collect upon it the sediment or drip, and direct it outwards and downwards, instead of throwing it back into the pipe. A series of drips is also attached, connected by a pipe termed a double drip. A drip box is placed at the joint beneath the float, and a pipe connects this drip box with a similar box situated near the gasholder, and at this point is placed a pump by which the drip may be pumped away.

After the gas has passed through its manufacturing process as described, either before or after it reaches the hydrocarbon chamber, it may be fixed by being brought into contact with a surface sufficiently heated to accomplish that object.

453.—West, J., Maidstone, "*Improvements in apparatus for charging gas-retorts.*" Patent dated Feb. 4, 1878.

This invention relates to improvements upon apparatus for which letters patents (No. 1255, April 4, 1873; No. 3225, October 4, 1873; and No. 1978, June 8, 1874) were granted to Mr. West, and has for its object the increased proportion of the internal capacity of the charger, so that a greater quantity of coal or other material may be introduced within the retort at each operation, and at the same time a portion of the coal may be thrown towards the sides of the retort, and subsequently distributed over its surface in a manner more conducive to its complete carbonization than in any previous arrangement.

The invention consists in hinging the sides of the charger at their upper part, so that they may follow the movement of two hollow scoops which are pivoted upon their longitudinal axes within the apparatus.

The rod and handle by which the charger is thrust into the retort is connected to a toothed wheel attached to the front of the charger, and this wheel gears into a toothed wheel fixed to the axis of one of the scoops, and into a pinion which gears into a toothed wheel fixed upon the axis of the other scoop, the wheels so geared being protected by a removable guard.

522.—Young, W., Clippens, N.B., "*Improvements in the manufacture or treatment of illuminating gas and in the apparatus employed therefor, the said apparatus being also applicable for the treatment of gases other than illuminating gases.*" Patent dated Feb. 8, 1878.

It is now a well-ascertained fact that the pulsatory movement of the products of distillation inside the retort, caused by the gases bubbling through the hydraulic seal, produces an extra deposit of carbon on the internal surface of the walls of the retort, and that when the gas-producing material is poor, or the temperature of the retorts high, even with a rich gas-producing material, there is, in consequence of this pulsatory action, a considerable deterioration in the illuminating power of the resulting gases, due to the over-decomposition of some of the volatile hydrocarbons and other highly light-giving gaseous compounds.

Experience has also shown that, although the temperature of the crude gases as they leave the stand-pipe and enter the hydraulic, is far below the volatilizing point of the great bulk of the liquid tarry products, yet at this point they are not precipitated from the crude gases, but are carried forward in a finely-divided state, along with solid sooty matter, into the condensers and scrubber and other parts of the manufacturing plant, where, from their absorbent action upon the illuminants, they deteriorate the illuminating power of the gas, and also, by clogging or closing the pores of the purifying material or the interstices in the scrubber, prevent their proper action.

This invention has for its principal object improvements in apparatus, whereby this pulsation of the products inside the retorts is prevented, and a precipitation effected of the sooty and condensed finely-divided liquid matters.

The apparatus consists of a valve-arrangement actuated by the pressure of the gas, being substituted for the ordinary hydraulic seal or dip-pipe. The valve may partake of a variety of forms, but must be of such a structure as to divide the gas into a minute stream, or sheet, issuing under a pressure equal to at least a column of water of preferably not less than 4-10ths of an inch in height, and as the sooty and pitchy tarry matters are liable to clog or close the orifices of the valve, it must be of such construction as shall either clean itself or otherwise adjust the size of the passage or passages as they become closed. The valve is also provided with a margin or plate placed opposite the edges of the valve, against which the issuing stream of gas is made to flow.

A very efficient form of valve consists of a concave or mushroom-shaped sheet of metal turned perfectly true round its edges, and fixed upon a central spindle or guide-rod. This valve or cover rests upon a seat, also turned perfectly smooth, and has a central hole or guide for the valve spindle, and a margin slightly larger than the mushroom-shaped valve cover. This valve arrangement may be conveniently fixed in a chamber or pipe attached to the ordinary dip-pipe immediately before it enters the hydraulic, a separate pipe being carried from the chamber over the valve into the hydraulic above the water-line.

The action of the valve is as follows:—The products of destructive distillation (gas, tar, soot, water vapour, and other products) issuing from the retort, pass along the stand-pipe, and press against the bottom of the concave valve and the water in the dip-pipe; but as the valve-cover is lighter than the column of water to be displaced in the dip-pipe it is lifted, and the crude gases and tars escape in a thin stream or sheet through the valve, and flow against the margin or ledging referred to. The sooty and tarry matters are thereby precipitated, and the cleansed gases pass by the supplementary pipe to the hydraulic. As the valve lifts steadily, and is prevented from jumping by stops placed on the valve chamber cover, all pulsation is prevented, and so soon as gas ceases to be made the valve falls, and thus automatically prevents the return of the gas into the retort.

In cases where the crude gases contain a very large quantity of sooty matter and a small quantity of tars, it may happen that these are not wholly removed by passing through a single valve arrangement. In such a case, duplicate valves may be employed, or (which is preferred) a series of valves may be placed on the outlet for crude gases from the hydraulic main.

Many other forms of valves may be employed, such as, instead of making the concave valve cover with a single edge turned quite true, it may consist of a number of concentric edges fitting into truly-turned concentric recesses; or it may partake of the form of a sluice-valve actuated by a gasholder; but the one just described will, it is believed, be found the most practically useful.

In the case of gases which do not contain sufficient tarry or other fluid matters to entangle and wash away the suspended finely-divided dust or sooty matters as they are precipitated, fluids of a suitable character, such as water for ordinary dry dust, or oils, either mineral or vegetable, for sooty dust or pitchy tars, may be showered over the valve-cover.

Another purpose to which these valves may with advantage be applied is the eliminating of ammonia from gases, and for purifying illuminating gases from carbonic acid and sulphuretted compounds by means of liquid purifying agents. When used for such purposes the valves are set in a series of chambers over each other, and the absorbent liquid made to flow successively over each valve-cover by pipes communicating from chamber to chamber. The liquid absorbent as it reaches the edges of the cover is violently commingled with the escaping sheet or stream of gas, and thus a very perfect absorption is brought about.

Another part of this invention relates to improvements in the manufacture of illuminating gas, the object being to produce a gas of high illuminating power, freedom from sulphur compounds, and non-liability to deposit crystalline naphtha in the mains and branch pipes during distribution.

This part of the invention consists in carbonizing the gas-producing

materials in separate retorts at temperatures which will produce the greatest volume of gas in the one case and of illuminating constituents in the other. Should the gas-producing materials be of different qualities, one being more bituminous than the other, the poorer material is distilled at a very high temperature, so as to liberate as far as possible the hydrogen of its constitution in the gaseous form, either combined as carburetted hydrogen or free hydrogen. The other or more bituminous substance is carbonized at a comparatively low temperature, little over dull redness—say a temperature of from 900° to 1300° Fahrenheit.

In the event of the gas-producing materials being of one quality, a proportion of each is distilled separately at different temperatures in the manner just described.

The poor gases (or those produced at high temperatures) are freed from their suspended tarry and sooty matter by preference by means of the apparatus previously described, and are then passed through or mingled with the rich gases (or those produced at low temperatures) whilst warm, preference being given to passing the prepared poor gases through the material undergoing carbonization for the production of the rich gas in the manner explained in the patent granted to the present inventor on March 29, 1877 (No. 1246).

The mingled gases are in turn subjected to condensation, the liquid matters being by preference precipitated by means of the apparatus before described, and are thereafter subjected to the usual purifying process and passed to the gasholder. When the tarry oils resulting from the distillation of the gas-producing material would be of small commercial value, they may be with advantage run back into the retort and subjected to further destructive distillation. Should the temperature at which the poor gas is produced be so high as to decompose nearly all the liquid tarry hydrocarbon, and leave a large quantity of sooty matter, the liquid oily tars produced from the low-heated retorts are employed to wash the poor gases either by running the tars into the hydraulic, or over the valve apparatus, or down the stand-pipes into the retort.

By conducting the manufacture of gas in this manner, a gas of high illuminating power is produced. The sulphur hydrocarbon compounds which are necessarily present in the poor gas made at high temperatures are, in the manner well known, by the re-heating of the gas in the low-heated retorts, converted in great part into sulphuretted hydrogen and deposited carbon, the sulphuretted hydrogen being easily removed by the ordinary process of purification, and a gas free from sulphur is produced.

When the poor gas has been produced from common coal, it will contain considerable quantities of naphthaline. The carburetting of the poor gases by the hydrocarbons produced at low temperatures prevents the precipitation of this material.

534.—Clarke, J. F., Moorgate Street, London, "*An improvement in apparatus for distributing water in public thoroughfares.*" Patent dated Feb. 8, 1878.

This invention relates to an improvement in hydrants or portable stand-pipes for supplying water in public thoroughfares and other places, similar to that described in the patent already granted to the present inventor, and bearing date July 30, 1874 (No. 2660).

The present invention consists in the employment of a screw-down valve constructed and applied as hereafter described, for controlling the delivery of the water, and especially for preventing the leakage to which such stand-pipes or hydrants have hitherto been liable.

The valve is fitted to work in a shell or box placed in a well below the surface of the ground, and communicating with the water-main, as usual, and the valve consists of a hollow or tubular plug of slightly conical form, or having a slightly-inclined face, which comes down against a corresponding inclined seat, and closes the inlet orifice from the water-main. This valve is fitted to work up and down vertical guides, which prevent it turning, and is rigidly attached to a female screw ring or collar, which screws upon a male screw of rapid pitch, cut upon the lower part of a vertical tube that rises through a stuffing-box and gland in the cover of the valve-box or shell. This tubular screw is formed with a collar or shoulder upon it that is retained between the cover and a guiding ring supported within the box or shell, so that the tubular screw stem is incapable of any vertical movement, but may be rotated by turning the stand-pipe. The latter has a socket at the lower end, which fits on the upper end of the screw tube, and is connected thereto by a bayonet joint or other suitable fastening, the stand-pipe forming a continuation of the screw tube, and both being of about the same bore for the passage of the water.

At the bottom of the valve-box there is a small spring waste-water valve, for the escape of any water remaining in the valve-box after the hydrant has been used. This escape valve is pressed on and opened by the main valve or plug when the latter is closed, and closed by its spring when the main valve is opened.

The main valve or plug is opened and closed by turning the stand-pipe round, and with it the tubular screw, whereby the female screw that works upon it and is prevented from turning, is drawn up or down together with the plug or valve, which is of sufficient internal diameter to pass freely over the screwed tube.

542.—Joslin, G., Colchester, "*Improvements in gas-meter indices, and in apparatus for testing the agreement of the measuring chambers of gas-meters with the standard gasholder and the accuracy of the indices.*" Patent dated Feb. 9, 1878.

This invention is based upon one for which provisional protection, dated Oct. 1, 1877, was granted to the present patentee, and has for its objects in the first place the construction of gas-meter indices in such a manner that the consumer may ascertain the consumption of gas for any particular period, and set the hands on the dials at zero whenever he pleases without interfering with the ordinary index attached to the meter. In the second place, for providing means for testing the agreement of the measuring chambers of gas-meters with the standard gasholder, and subsequently for testing the accuracy of the registration of indices, without necessitating the revolution or vibration of the measuring chambers of the meter. And, in the third place, for the construction of apparatus for testing the accuracy of the registration of indices generally.

The invention consists, firstly, in attaching a train of wheels with three or more dials, which constitutes another index in connection with the ordinary index, but partially independent of it. This additional index is called the consumer's index. The consumer's index is driven by the usual gas-meter index, and is so arranged that by means of friction, or by means of a friction or slip wheel or wheels, and a key or knobs, each pointer or hand may be turned separately, or set upon its own spindle. The consumer may therefore set the index to zero, or to any other figure or position he desires, so as to show the consumption for any given time, without altering the position of the hands or registration of the index recognized by the gas company or supplier of gas.

The invention relates, secondly, to providing means for the attachment of the gas-meter index to the standard or testing index, and for disconnecting the action of the measuring chambers from the index. This consists in so arranging the parts that through an opening in the case of the meter, or by removing the glass, the connecting shaft of the standard or testing index (which forms the subject of the third part of the invention) may be attached to the units dial or drum of the gas-meter index and revolve with it. Through the same opening a nut or screw on the spindle or shaft of the gas-meter index may be slackened, thereby allowing the dial or drum, with one of the wheels or a worm attached to it, to revolve independently of the shaft or spindle, and without actuating the measuring chambers, and, by tightening this nut or screw, the measuring chambers actuate the dial or drum and the index in the usual manner.

The invention consists in the third place in the construction of a standard or testing-index, which is driven by clockwork, by hand, or other suitable motive power, and has an extensible shaft or spindle which indicates one cubic foot for one revolution. This shaft has a universal joint, and is made square, or of other shape corresponding to the units dial or drum of the gas-meter index. Some of the wheels that form the train of the index and the spindles or pinions of the same have attached to them circular plates which revolve with them, each plate having a notch or opening in its edge. The spindle of each wheel and pinion passes through a front plate, upon which three, four, or more dials are drawn, and to each spindle a pointer is attached corresponding to and opposite the notch or opening before mentioned. Over the circular plates is a moveable bar provided with pins or projections which drop into the notches or openings in the circular plates as they revolve in succession, and when all the pins have dropped into their corresponding notches or indents the apparatus will stop, and the hands on each of the dials will point to zero. The last movement of the bar will also cause the striking of a bell, thereby announcing that the test is completed.

The manner in which the apparatus is used is as follows:—The standard or testing index is arranged upon, or fixed to a suitable support. The units dial or drum of the gas-meter index to be tested being fixed upon its shaft or spindle by tightening the nut or screw upon the same, and the extensible connecting shaft of the standard index being connected to it, testing may be commenced with the standard gasholder in the ordinary manner. If the movement of the hands of the standard index agrees with the standard gasholder, and with the units dial or drum of the gas-meter index, the test up to this point may be considered satisfactory. To test the remainder of the train of the index, it is necessary to slacken the nut or screw on the shaft. The bar before referred to is then lifted, the hands are set, and motion is imparted to the indices, when they will revolve together. If the index tested proves to be correct, it may be released from the standard index, the wheel or worm being again firmly fixed on the shaft or spindle by tightening the nut or screw. The opening in the case of the meter, or the glass in front of the index, and the nut or screw on the spindle or shaft, where the connection was made between the standard index and the meter index, may then be soldered or sealed up by the tester.

If one revolution of the units drum or dial of the gas-meter index about to be tested indicates 1 cubic foot, which is shown on the units dial of the standard index, the gas-meter index is to be set at zero, and the standard index must be set at a complete revolution of the gas-meter index. Motion is then given to the standard index, and as the motion is transferred to the index to be tested they both revolve together; or if one revolution of the units drum or dial of the gas-meter indicates 5 cubic feet, or five times as much as the units dial on the standard index, then the complete revolution of the gas-meter index (say, 100,000) must be divided by 5, and the standard index set at the quotient (20,000), or one-fifth of the complete revolution of the gas-meter index. When the hands of the standard index have reached zero, the bar will fall, the bell will ring, and both indices will stop. The two indices may then be compared, and if each of the hands of the tested index points to zero, the tester may be sure of the accuracy of the index tested.

The standard index may be used as a whole as described, or it may be divided so as to suit the testing of the measuring chambers alone.

555.—Brown, J., Townsend Street, London, "*Improvements in cocks or valves.*" Patent dated Feb. 9, 1878.

This invention has for its object improvements in cocks or valves. In constructing cocks or valves for steam, water, gas, and other fluids, there is formed, in the shell or body of the cock, a diaphragm separating the inlet from the outlet side, and in the centre of this diaphragm a socket or bearing for the end of a valve spindle is formed. The valve spindle also passes through a bush which is screwed into a cover, closing the body of the cock on the exit side of the diaphragm. When necessary a cap is applied over the bush, and a packing to form a fluid-tight joint around the spindle. On the outer end of the valve spindle there is a handle by which it can be turned partly round. On the face of the diaphragm there are two or more bosses or elevations, and through each there is a hole with a facing upon the boss around it.

The valve spindle has a disc valve formed upon it, and by means of the bush through which the spindle passes this disc can be set down into fluid-tight contact with the faces formed upon the bosses on the diaphragm. There are holes formed through the disc valve corresponding to those through the diaphragm, and by turning the valve spindle and valve the holes can be brought together, when the fluid passes freely.

An alternative arrangement is to form a screw thread upon the valve spindle and bush, so that by turning the spindle the valve is lifted from its seat.

When it is desired to use a single cock for both hot and cold water, a similar construction to that first described is employed, two holes in the diaphragm being formed and caused to communicate separately with the two supplies.

The disc valve revolves in front of the diaphragm, and so closes the holes, but it has a perforation through it which can be brought to correspond with either of the holes in the diaphragm when it is desired that the water should flow.

562.—Jefferies, J. H., Wolverhampton, "*Improvements in ball and bib taps.*" Patent dated Feb. 11, 1878.

This invention consists of improvements in the construction and arrangements of parts of ball and bib-taps. The improvements are especially applicable to ball-taps, but may also be applied to bib-taps.

Applying the invention in connection with a ball-tap, the valve-seat consists of a circular opening formed in a cap or nozzle, screwed on the vertical end of the supply-pipe. A ring of india-rubber, or other flexible material, is placed upon the valve-seat, and this constitutes a water-tight packing. The valve consists of an inverted cup-like or mushroom-shaped head, with a long pendent stem or stalk on its under side. The edge of the head of the valve (when the tap is closed) rests upon the india-rubber packing on the valve-seat. The long stalk or stem of the valve protrudes below the bottom of the nose of the delivery-pipe. Attached to the back of the nozzle described is a bracket, to the lower end of which the lever of the ball or float is jointed. On that part of the lever of the ball or float situated in front of the stalk of the valve is a short horizontal arm crossing the stalk. When the lever of the ball is horizontal, this short arm does not touch the stalk of the valve, but when the ball or float descends by the sinking of the level of the water, the short arm comes against the stalk of the valve, and deflects it from its vertical position.

The action of the tap is as follows:—When the lever of the ball or float is in a horizontal position, the valve rests upon its seat, and is pressed closely thereon by the pressure of the water upon it. When by the

descent of the level of the water in the cistern the ball or float sinks, the horizontal short arm on the ball lever presses against the stalk of the valve, forcing it out of its normal vertical position. By this action the valve is tilted on its seat; that is, its edge is no longer parallel to the seat of the valve, and it now rests at one point only on its seat, the other part of the edge being raised from the seat. Water consequently passes through the tap. When the level of the water in the cistern is raised, and with it the ball or float, the short horizontal arm on the ball lever no longer presses on the stalk of the valve. The stalk consequently resumes its vertical position, the edge of the valve bears on its seat all round, and the tap is closed.

The application of these improvements to bib-taps differs but very little from its application to ball-taps. The pressure upon the stalk of the valve, which in the case of a ball-tap is produced by the action of the ball or float, is in a bib-tap produced by a lever or screw, or other equivalent mechanical arrangement.

595.—HADDAN, H. J., Westminster, "*Improvements in stop-cocks.*" A communication. Provisional protection only obtained. Dated Feb. 13, 1878.

These improvements consist in the construction of a stop-cock with a conical plug to be shut and opened by a screw spindle, and which may be readily applied with a band or similar contrivance to any existing pipe by perforating its side under pressure, and when the pipe is in use (under pressure or otherwise) in combination with or without an automatic draining-valve. Also, in so forming the box and plug of the cock that when the plug is in open position it is wholly retired out of the steam or water passage, which is in all points of the same section. Further, in forming the box and plug so that a borer may be introduced in the passage-way of the cock, and be correctly guided by a conducting collar or box, when, after finishing the operation of perforating the pipe to which the improved stop-cock is applied, the borer may be withdrawn, the cock shut, and no loss of water or steam from the pipe take place.

613.—PEARSON, H. J., Beeston, Notts, "*Improvements in valves.*" Patent dated Feb. 14, 1878.

According to this invention each valve consists of a metal case, the ends of which form sockets or spigots to receive or enter the ends of the pipes to which the valve may be applied. The case is slotted longitudinally on the top side, and is fitted with a cap of metal provided with a stuffing-box, through the side of which a pin is secured. This pin takes into a recess formed by a portion of a flange on a winged spindle being cut away, thus regulating the opening or closing of the valve; also preventing the valve wing being turned the wrong way. The spindle is passed through the stuffing-box, and terminates at its lower end in a pin which takes into a hole in the bottom of the case. The cap has a V on its under side, which fits in the slot in the case, and is held in place by screws.

633.—PORTEOUS, A. N., Edinburgh, "*Improvements in the production of hot-air gas, and in the use of the same for motive purposes and for illumination.*" Provisional protection only obtained. Dated Feb. 15, 1878.

This invention has for its object the production of gas from liquid hydrocarbons by means of hot air, and using such gas in engines for producing motive power suitable for propelling tramway cars and for other purposes; also in using such gas for illuminating purposes.

The invention consists in forcing air by means of a pump or blower into a tank, so as to obtain the required pressure therein, then passing air therefrom under pressure through a furnace, by which it becomes heated to the required degree, such heated air being then passed through a chamber containing a sponge or other suitable porous material saturated with paraffin or other suitable hydrocarbon. The heated air in passing through the sponge absorbs a portion of the liquid, more or less, according to its temperature and dryness, and regulated in such quantity as to render the mixture an explosive gas. This gas is thence passed to the engine, and there expanded to atmospheric pressure and afterwards exploded, thereby causing a vacuum for the return stroke of the engine; or it may be regulated in such quantity as to render the mixture an illuminating gas, and used in works for the purpose of illumination, or in the furnace for the purpose of heating.

640. — LYON, H., Manchester, "*Improvements in the construction of washers and scrubbers for purifying gases.*" Provisional protection only obtained. Dated Feb. 15, 1878.

This combined washer and scrubber for purifying gases, is constructed by preference of cast iron, and of an oblong rectangular form, bolted together in layers one above another. The lower portion receives the gas through one or more inlet pipes or branches, and the interior of the entire upper portion is divided by plates of metal, earthenware, glass, wood, or any other suitable material) into a series of parallel horizontal cells extending from side to side of the external casing. The cells communicate with each other alternately at each end, so as to compel the gas passing through them to pursue a tortuous or ziz-zag course, and thus bring the gas into contact with the ammoniacal liquor or other purifying agent, which is permitted to flow freely through the lower cells. As the gas rises higher in the apparatus it comes into contact with clean water, which is allowed to enter the apparatus at the top and to trickle down through the cells; and, after passing them, the gas escapes in a purified state through an outlet-pipe at the top.

The plates which form the cells, and which constitute the essential feature of the invention, when made of metal, glass, or earthenware, are so moulded, cast, or formed with projections and open grooves at one side, and perfectly plain at the other side, that when two of the plates are placed together they constitute a cellular structure, which may be extended to any desired extent.

682.—FRYER, A., Wilmslow, "*Improvements in the method of and apparatus for treating the refuse of towns.*" Patent dated Feb. 9, 1878.

This invention relates—first, to improved methods of and apparatus for preparing refuse material for treatment in the special furnaces patented by the present inventor on the 5th of August, 1876, No. 3125; secondly, to improved methods of treating the material in these furnaces, and in the evaporating apparatus connected therewith; thirdly, to improved methods of and apparatus for treating the "pail contents" before they enter the evaporating apparatus; and, fourthly, to an improved method of and apparatus for treating the semi-solid matter which issues therefrom.

723.—WEBSTER, G. E., Nottingham, "*Improvements in apparatus for registering the consumption of gas.*" Provisional protection only obtained. Dated Feb. 21, 1878.

This invention consists of a meter composed of two receivers working in a vessel of water. The meters may be applied to act either for regulating the consumption of single jets (when they are called observation photometers) or for a number.

For the purpose of carrying out the invention, two cylindrical vessels are employed, fitting one inside the other. The top cylinders act as the gas receivers, and rise according to the amount of gas admitted to them by the inlet-pipe. When this is shut off, the receivers, which have an escape tap connected to them, fall according to the escape at the tap, and thus measure the amount of gas consumed by the rate at which they fall. This arrangement is for registering the consumption of single jets.

When this is applied as a meter, the receivers are arranged as before, but work alternately—that is, one rising whilst the other is falling; and in order to economize space, there is an internal tin or cylinder in each, which is half filled with water, the two being connected together before the gas is admitted. When, therefore, the gas is admitted to one cylinder, and is escaping out of the other, the water flows from that cylinder into the one from which the gas is escaping, leaving the other.

The action of the meter is that when one receiver is filling with gas the other is falling, and thus an uninterrupted stream of gas is supplied, and the amount accurately measured.

If the two cylinders above described are placed to work without the registering motion, the apparatus acts as a governor. When the registering motion is on, it acts as a meter and governor combined, which may be regulated.

729.—WILSON, W. P., New Cross, London, "*Improvements in the method and in apparatus used in the purification of gas, parts of which apparatus are also applicable to the carburetting or measuring of gas or atmospheric air.*" Patent dated Feb. 21, 1878.

This invention relates to apparatus having for its object the more perfect and economical condensation and purification of illuminating gases. This will be effected by the removal of the tar while the gases are at a high temperature, the re-volatilizing of such of the hydrocarbon vapours and rich gases which have been absorbed by the tar, the application of heat to the gases so as to effect a more gradual and equable condensation, and, at the same time, utilizing the heat in the gas for the evaporation of caustic ammonia, and facilitating its combination with the impurities; also affording time for the hydrocarbon vapours and rich gases assimilating within the range of their affinities before reaching the final operations for the removal of the impurities, which will be by a continuous method of liquid purification. Part of the apparatus is applicable also to the carburetting and measuring of air or gas.

[The apparatus is not described apart from the 21 illustrations accompanying the specification.]

736.—FIELDING, J., Gloucester, "*Improvements in fluid pressure engines, fluid-meters, and pumps.*" Patent dated Feb. 22, 1878.

This invention relates to an engine to be worked by water or other fluid under pressure, having for its object simplicity and compactness, a like construction being applicable as a fluid-meter, and as a pump for raising or forcing fluids.

According to this construction, a cylinder, open at both ends, is fitted to oscillate on trunnions within a casing bored concentric with the axis of the trunnions. The ends of the cylinder are provided with lips or flanges curved to fit the interior of the casing, which is made with suitable ports and passages, so that as the cylinder oscillates its lips act as slides, partially rotating, covering, and uncovering the ports of the casing, and so governing the admission of the fluid to either or both ends of the cylinder and its emission therefrom. These lips are preferably made adjustable, and pressed by springs to allow for wear. The cylinder is fitted with a piston, the rod of which works through a guide at one end of the cylinder, and is jointed to a crank on a shaft. The crank is cased in, and its shaft passes through stuffing-boxes in the sides of the casing. The piston-rod guide and the shaft bearings may be fitted with wood strips. Several engines as described above may be arranged to act on one crank-shaft. The apparatus may be used as a meter by connecting a counter to its shaft, so as to measure or register the quantity of fluid passing through it. Also, by driving the crank-shaft by extraneous power, the apparatus may be employed as a pump for raising or forcing liquids or exhausting or compressing aëriform fluids.

755.—PEEBLES, D. B., Bonnington, Edinburgh, "*Improvements in apparatus for governing or controlling the flow or pressure of illuminating gas and other fluids, and in part relating to the testing of gas.*" Patent dated Feb. 23, 1878.

This invention comprises various improvements in constructive details and in the modes of combining the parts of gas apparatus, and has generally for its objects the better governing or controlling of the flow or pressure of illuminating gas and other fluids, and the convenient and accurate testing of gas. The present improvements are to some extent further developments or modifications of those described in the specification of patent No. 1626, obtained by the present applicant, and dated April 26, 1877.

One improvement is applicable to governors for delivering a constant volume of gas to one or more burners, in which, as hitherto made, a light disc carrying an upward acting conical valve has been acted on by the inlet pressure, so as to raise the valve more or less into the exit orifice. The improvement consists in substituting for the disc a comparatively long hollow flanged cone or conical pointed tube, made of tin, vulcanite, or other suitable material, the conical point forming the valve, whilst a central point, stud, or needle, is provided for the interior of the conical point to rest on when the gas is shut off. This arrangement is much less liable to stick when at rest than a disc which rests on several points or against the side of the chamber. The flow of gas is adjusted by a screw plug and a small lateral passage.

A second part of the improvements consists in arranging or constructing the parts of a gas-governor for districts or for similar uses in an improved simple and reliable manner without requiring a liquid or a flexible diaphragm. The valve, which may be made of vulcanite, tin, or other suitable material, is in the form of a drum arranged to move vertically through a circular aperture in a horizontal division of the casing, the inlet gas having access to the under sides of the drum valve, and the space above it being in communication with the outlet. The drum valve is more or less counterbalanced by a weighted lever, its remaining or effective weight diminishing to a corresponding extent the pressure of gas in the outlet as compared with the inlet pressure. When the valve is raised, the gas passes by indentations or cavities made at suitable intervals round the cylindrical sides, and these indentations are by preference made angular, with straight or curved sides, and placed so as to open or uncover successively, so that when the valve is nearly closed its movement will make comparatively less difference in the extent of passage for the gas. Beneath the drum valve there is by preference a fixed cylindrical shell, within or over which the valve works freely, and which tends to prevent changes of pressure from acting suddenly on the valve. Instead of the cylindrical part of the valve being indented without being perforated, the angular openings may be cut through it; and, in this case, the inlet or outlet gas should have free access to the interior of the valve.

In a third improved governor, a modification of the laterally-indented drum valve of the second modification is arranged as a reducing valve for water or other fluid, the cylindrical part of the valve being extended downwards and working through an orifice into a space beneath the main casing, in which space it is connected to a counterweighted lever, or is acted on by water, which, by means of a stand-pipe or otherwise, is made to have a pressure corresponding to that to which the fluid passing the valve is to be reduced. The orifice through which the cylindrical part of

the drum valve works is either packed or made sufficiently close-fitting, and, when a counterweighted lever is used, a receptacle and an outlet are provided for the leakage. In this modification, also, instead of the indentations in the valve being formed without perforating the shell, they may be cut through it, and two or other number of large angular openings may be made instead of numerous small indentations.

In a fourth modification of governor suitable for gaseous fluids, the drum valve with lateral indentations, or with angular openings, is inverted, as compared with its position as previously described, the inlet pressure acting on the top of it, and also inside a bell floating in water in a casing above the valve. The valve is connected to the bell by a rod passing up a central pipe, through which pipe also the gas reaches the bell, and a weighted lever is applied to counterbalance part of the weight of the valve and bell, or a float is fixed to the bell for that purpose. The lower part of the drum valve may be arranged to work within or over a fixed cylinder in the outlet space, to prevent oscillation.

The fifth modification of governor resembles the fourth, excepting that the valve is conical, and there is beneath the valve-seat a cylindrical shell, within which the bottom or closing part of the valve works; and this cylindrical shell is formed with angular openings, which make the change of extent of passage less, relatively to the movement of the valve, when near the closing position. The points of the openings are, by preference, placed in different positions so as to open or uncover successively. The cylindrical angularly perforated valve-seat shell is advantageously applicable in connection with very many gas-governor valves, and may be made of vulcanite, tin, or other suitable material. The valve-seat shell may also be formed with indentations or cavities on its inner side, instead of having perforations.

In a sixth modification of governor suitable for gaseous fluids, the valve is a disc working upwards from a seat, which has the cylindrical angularly perforated shell, and the disc is connected by a central stem to a bell of about the same diameter; the gas inside this bell being in communication (by pipes passing through the bottom of the governor casing) with a separate governor or controller, according to the system described in the before-mentioned patent. For moderate and large sizes the separate governor or controller is, by preference, of the kind having a bell floating in water; and whilst the inside of the bell is always in communication with the bell of the main governor, the pipes by which gas passes to and from the bell are fitted with stopcocks, so that when circumstances render it desirable the stopcocks may be closed, and the bell be simply loaded to give the desired pressure.

The seventh modification of governor differs from the sixth in there being substituted for the cylindrical angularly slotted valve-seat shell a modification of the laterally indented drum valve of preceding modifications. This drum valve is open-topped, and there projects down into it a fixed cylinder which prevents oscillation. The floating bell is of the diameter of the valve, and its top is below the indented cylindrical part.

An improvement applicable to the sixth and seventh modifications of governor, and also to some others, consists in connecting by a pipe the interior of the bell or floating valve supporter to a bladder or a bag made wholly or partly of a flexible material, such as bladder skin softened with glycerine, and loaded with a weight, or by being submerged under a column of water, or other suitable liquid.

Another improvement consists in making the bell or floating casing of vulcanite.

The improved gas-testing apparatus comprised in the present invention is designed to indicate the density or quality of illuminating gas by comparing its rate of issue through an orifice with that of atmospheric air. For this purpose two gasholders are combined, with their tanks and accessory details, all made as nearly alike as possible, and with scales accurately showing the volumes corresponding to the various positions of the holders. Each holder has provided in connection with its outlet-tube a burner with a platinum tip or other suitable orifice piece, and when adjusting the apparatus, both holders are filled with atmospheric air, and then equally loaded. The stopcocks are then opened simultaneously, and the orifices equalized, so that the air passes through each at exactly the same rate. For testing purposes the holders are next filled, one with air and the other with the illuminating gas to be tested, and then the stopcocks are opened. The difference in the rates of issue of the air and gas is carefully noted from the scales, and the quality of the gas is calculated or estimated accordingly. It is an important advantage of this arrangement that the accurate working of the apparatus can at any time be made certain by trying the two holders with air, or with the same gas.

APPLICATIONS FOR LETTERS PATENT.

3691.—Weekey, S., Strand, London, "Improvements in the method of and apparatus for manufacturing or generating gas." Sept. 15, 1879.

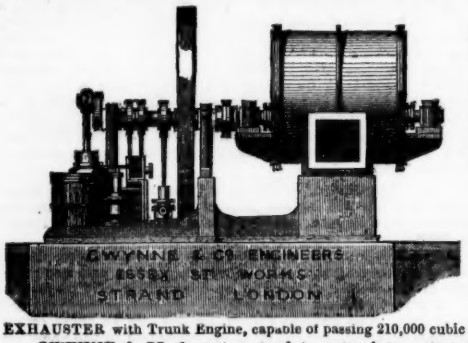
3694.—Lake, H. H., Southampton Buildings, London, "Improvements in and relating to apparatus for the manufacture of illuminating gas." A communication. Sept. 15, 1879.

3697.—Clark, A. M., Chancery Lane, London, "Improvements in electric lamps or regulators." A communication. Sept. 15, 1879.

3699.—Chalory, M. A. L., Paris, "Improvements in apparatus for making gas for lighting and heating purposes." Sept. 15, 1879.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

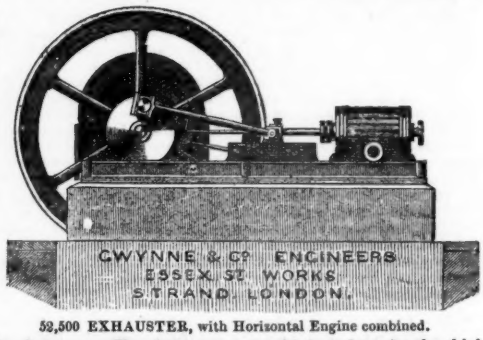
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

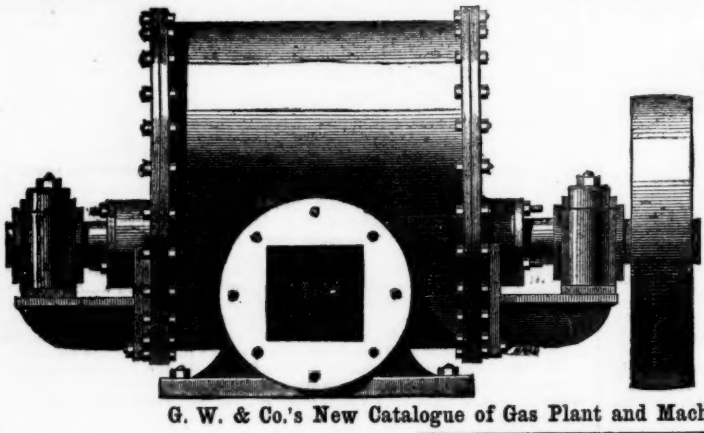
GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers,
ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS,



WITH OR WITHOUT
WROUGHT-IRON SPINDLES AND
ENGINES COMBINED.

GEORGE WALLER & CO.,
MAKERS OF
ENGINES, EXHAUSTERS,
INDEX AND DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, AND OTHER PUMPS,
SCRUBBERS AND PURIFIERS,
CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

PHŒNIX ENGINEERING WORKS:
HOLLAND STREET, SOUTHWARK, S.E.

WANTED, Readers of the NEW Edition, 1879, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED, in a Provincial Works, a Retort-House FOREMAN. State particulars and wages required.
Address No. 587, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

AMMONIA WORKS

WANTED, an experienced Man as Out-door MANAGER of a large Sulphate of Ammonia Work and Tar Distillery.
Apply by letter (enclosing copies of testimonials) to No. 585, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, small Second-hand Gas-holder and Tank. Must not be larger than 8 ft. by 7 ft., but may be smaller. Also a small Meter with large Index for testing Burners.
State size, condition, and price, which must be low, to W. H. VAUGHAN, Gas Engineer, &c., CHARLBURY.

WANTED, by the Peel Gaslight Com-pany, a Competent WORKING MANAGER, perfectly conversant with Laying of Mains, Connecting Service-Pipes, Manufacture and Distribution of Gas, and whatever may be incidental to the working of Gas-Works.
Applications (containing copies of testimonials) to be addressed to Mr. R. E. WIGHT, Secretary, Peel, ISLE OF MAN.

WANTED, a Re-engagement as WORKING MANAGER of a small Gas-Works. Has a Practical Knowledge of the Manufacture and Distribution of Gas, Retort-Setting, Main and Service Laying, Meter-Fixing, and Indoor Fittings. Unexceptionable references.
Address No. 584, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Re-engagement as MANAGER of a medium-sized Gas-Works, or ASSISTANT in a large works. Over 20 years experience in all branches. Has charge of Gas-Works making over 100 millions annually. Would consent to be paid by results. References, testimonials, &c., from previous employers.
Address No. 581, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

EAST RETFORD CORPORATION GAS UNDERTAKING.

WANTED, two thoroughly Steady and Reliable WORKING FOREMEN to take charge of the Gas-Works, and machinery connected therewith. Parties applying must be up in Carbonizing. References as to character and ability required.
Particulars of duties may be obtained by applying as under.
FREDK. BAILEY, Manager.

TO TAR DISTILLERS AND SULPHATE OF AMMONIA MANUFACTURERS.

A Man of 15 years experience is open to an Engagement as MANAGER or FOREMAN. Understands Book-keeping and general office business.
Address No. 586, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A Gentleman with a valuable Connec-tion among Gas Companies in the North Midland districts, is desirous of representing a good Firm in Dry and Wet Gas-Meters, on Commission and Expenses.
Address B., care of W. H. Bennett, Esq., 22, Great George Street, WESTMINSTER, S.W.

NEWPORT (MON.) GAS COMPANY.

COLLECTOR WANTED.

REQUIRED, an additional Collector. Salary £80. Security to be given. Applications (in writing), enclosing testimonials, stating age, &c., to be addressed to the Directors before the 29th of September.
By order,
EDWARD F. MARFLEET, Secretary.
Sept. 19, 1879.

GAS MANAGER WANTED.

THE Directors of the Portrush Gas Com-pany, Limited, require a Steady WORKING MANAGER, who thoroughly understands the Manufacture and Distribution of Gas, Main and Service Laying, Setting of Retorts, and Gas-Fitting. About 200 tons of coal carbonized yearly. He will require to enter upon his duties on the 4th of October next. He will have a house, coal, gas, and garden free.
Applicants to forward recent testimonials, and state salary expected, if married and what family, to JOHN BAMFORD, Secretary, PORTRUSH, on or before the 25th of September.
Portrush, Sept. 12, 1879.

SLEAFORD GAS COMPANY, LIMITED.

FOR SALE.—Single Gasholder, 32 ft. by 14 ft., Counter-balanced, Connections and all complete, in good condition. Reason for removal, ground wanted.
Particulars to be had of HARRY WIMHURST, Manager.

FOR SALE—Three Purifiers, 9 ft. by 6 ft., by 3 ft. deep, all complete, with grids and bearing bars for same.
The above are for Sale in consequence of having been replaced by larger. No reasonable offer will be refused for the whole or for a portion.
Apply to F. BOWER, Manager, North Bierley Gas-Works, Low Moor, near BRADFORD.

FOR SALE—Two Purifiers, 4 ft. by 4 ft. by 3½ ft. deep. Four tiers of Wood Grids. Six 4 in. Valves. As good as new. Removed to make room for larger.
Apply at the Works, Plympton District Gas Company, Limited, Underwood, PLYMPTON.

PHŒNIX GASLIGHT AND COKE COMPANY.
NOTICE is hereby given that the ADJOURNED HALF-YEARLY GENERAL MEETING of the PROPRIETORS holding, previous to the 30th of June last, £300 and upwards of paid-up capital in the said Company, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 1st of October, at Two o'clock precisely, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring Dividends to the 30th of June last, and on other business.
The Transfer Books will be closed from the 10th of September until the 1st of October, both days inclusive.
By order,
I. A. CROOKENDEN, Secretary.
70, Bankside, London, S.E., Sept. 6, 1879.

SOUTH METROPOLITAN GASLIGHT AND COKE COMPANY.
589, Old Kent Road, S.E.
NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at the Terminus Hotel, London Bridge Station, in the Borough of Southwark, on MONDAY, the 13th day of October next, at Two o'clock in the afternoon precisely, to receive the Directors Report and the Accounts of the Company for the Half Year ended the 30th of June last, and to declare a Dividend for the same period.
The Transfer Books will be closed from the 29th of September until after the Meeting.
By order,
GEORGE LIVESEY, Secretary and Engineer.
Sept. 20, 1879.

TO BE SOLD, Cheap, Three Telescopic GASHOLDERS, two 60 ft. diameter and 20 ft. deep each lift, and one 70 ft. in diameter and 20 ft. deep. Only been in use eight years. May now be seen at work at the Effingham Street Gas-Works, Sheffield.
For price, apply to THOMAS PIGGOTT AND CO., Spring Hill, BIRMINGHAM.

DRY GAS-METERS.

WE have a large extra Stock of these, in three, five, and ten lights, of the best make, that we can offer at less than half the list price. Have been tested by the City Gas Inspector. Also a few 100 to 300 lights, equally low in price.
HODGE AND CO., Gas Engineers, 100 and 101, Hatton Garden, LONDON, E.C.

GAS PLANT FOR SALE.

A 10-in. Vertical Pipe Condenser, having 20 Pipes, each 19 ft. high, on Cast-Iron Base Box.
A Scrubber, 16 ft. high 5½ ft. diameter, fitted with thin boards, Self-Acting Liquor Distributor, 10-in. inlet and outlet pipes.
Two Single-Flue Cornish Boilers (new in 1870), each 9½ ft. long, 3 ft. 9 in. diameter; Fire Tube of Low Moor Iron, complete with all Fittings.
All in good working order; removed to make room for larger plant.
For further particulars apply to THOS. TREWHITT, Gas-Works, WEST HARTLEPOOL.
May 8, 1879.

IMPROVED PHOTOMETER DISCS.

PRICE for a single Disc, sent free by post, 1s. 7d. Price per dozen, 12s. 6d.
Apply to J. WILKINSON, Gas Engineer, &c., Grimesthorpe, SHEFFIELD.

EXHAUSTER—Beale's 30,000 feet per hour; Makers, Burton and Waller; fit for immediate use—for sale cheap.
For price and particulars apply to the MANAGER, Brentford Gas-Works, SOUTHALL.

CITY and Guilds of London Institute for the Advancement of Technical Education. Technological Examinations. The programme for 1880 is now ready, and can be obtained gratis, on application to the SECRETARY, City and Guilds Institute, Mercers Hall, LONDON, E.C.

BETTWS-Y-COED GAS-WORKS.

THE Directors desire to dispose of the Works, Plant, &c., of this undertaking, and invite TENDERS for the same, which are to be sent in not later than the 30th inst., addressed to the Directors, Bettws-y-Coed, near Llanrwst, Carnarvonshire.
Application to inspect the works and premises to be made to the man in charge.

CAST-IRON PIPES.

THE Gas Committee of the Corporation of Warrington are prepared to receive TENDERS from parties willing to contract for a Supply of Cast-Iron PIPES from 6 inches to 20 inches in diameter.
The particulars and conditions may be obtained from the undersigned.
Sealed tenders, endorsed on the outside "Tender for Pipes," to be sent in on or before Thursday, the 2nd of October next.
The Committee do not bind themselves to accept the lowest or any tender.
JAMES PATERSON, Engineer.
Gas-Works, Warrington, Sept. 11, 1879.

TO GASHOLDER MAKERS.

THE Gas Committee of the Corporation of Warrington are prepared to receive TENDERS from parties willing to contract for the Construction of a Telescopic GASHOLDER, 120 ft. in diameter and 23 ft. deep in each lift.
Plans and specifications may be seen on application to the undersigned, at whose Office sealed tenders, endorsed on the outside "Tender for Gasholder," will be received until Thursday, the 16th of October next.
The Committee do not bind themselves to accept the lowest or any tender.
JAMES PATERSON, Engineer.
Gas-Works, Warrington, Sept. 20, 1879.

AMMONIACAL LIQUOR FOR SALE.

THE Directors of the Selby Gas Company are open to receive OFFERS for the AMMONIACAL LIQUOR produced at their Works, for a term of Three years, commencing on the 1st of November.
Tenders to be delivered on or before the 30th inst., addressed to the undersigned, from whom all particulars may be obtained.
No pledge is given that the highest or any offer will be accepted.
By order,
THOS. BELL, Secretary and Manager.
Gas-Works, Selby, Sept. 11, 1879.

TO GASHOLDER MAKERS.

THE Directors of the Gloucester Gas Company invite TENDERS for a GASHOLDER, 140 ft. diameter and 35 ft. deep, to be erected at their new Works, Hempsted.
Drawings and specification can be seen, and forms tender obtained, on application at their new Works, Hempsted, on and after the 15th inst.
Sealed tenders must be sent in to me, and marked "Tender for Gasholder," on or before the 30th inst.
The Directors do not bind themselves to accept the lowest or any tender.
E. MORLAND, Engineer and Manager.
Gas-Works, Gloucester, Sept. 6, 1879.

OLDBURY LOCAL BOARD GAS-WORKS.

THE Oldbury Local Board are prepared to receive TENDERS for the Erection of a New GAS-WORKS, to supply their district with gas.
The drawings and specification may be seen on application to the Engineer, Mr. A. Upward, 8, Queen Anne's Gate, Westminster, on and after Wednesday, Sept. 10, 1879, and sealed tenders are to be delivered to me, the undersigned, on or before Wednesday, Oct. 15, 1879, addressed to the Chairman and Members of the Oldbury Local Board.
Forms of tender may be obtained at the Office of the Engineer on payment of one guinea, which will be returned on the receipt of a *bonâ fide* tender on the form supplied.
The Board do not bind themselves to accept the lowest or any tender.
A. WRIGHT, Solicitor, Clerk to the Board.
Board Room, Oldbury, Sept. 18, 1879.

THE Directors of the Horsham Gas Com-pany, Limited, invite TENDERS for their Surplus TAR and AMMONIACAL LIQUOR until Michaelmas, 1880.
The quantity for disposal is expected to be about 500 Barrels of Tar and 300 of Liquor.
No one Barrel to exceed 40 gallons.
The purchaser to provide barrels, when required, and to pay all railway charges.
The Company to pay all charges between their works and the Horsham Railway Station.
Tenders to state the price offered for Tar per barrel, and a scale of prices for liquor of 4, 5, and 6 degrees of Twaddel's Hydrometer.
Payments to be made quarterly.
Sealed tenders, endorsed "Tender," to be sent to the undersigned, on or before Saturday, Oct. 11.
ROBERT SHEPPARD, Secretary.

DONCASTER CORPORATION GAS-WORKS.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the Borough of Doncaster are prepared to receive TENDERS for the Purchase of the Surplus TAR produced at their Works from time to time during a period of One, Two, or Three years, from the 1st of October next. Coals carbonized, 6000 Tons per annum. The Tar will be delivered into barges in the River Don, alongside the Gas-Works, and in no other form.
Also for the Purchase of about 70 Tons of SPENT OXIDE. Original material, Irish bog ore.
Forms of tender and any other information may be obtained on application to Robt. Bridge, the Engineer.
Tenders, sealed and endorsed, to be sent in on or before Thursday, the 9th of October next, addressed to the Chairman.
The right to accept the highest or any tender is reserved.
By order of the Gas Committee,
Alderman W. C. CLARK, Chairman.
Gas-Works, Doncaster, Sept. 18, 1879.

CORPORATION OF BIRMINGHAM—GAS DEPARTMENT.

THE Committee of the Gas Department will shortly invite TENDERS for the TAR to be produced after the 1st of July next, at their Saltley, Windsor Street, and Adderley Street Works, in Birmingham, and their West Bromwich Works. The total quantity of Tar now made at these works is about 18,000 tons per annum.
The Committee are prepared to consider APPLICATIONS to LEASE a portion of the land belonging to the Gas Department at West Bromwich or Saltley, for the purpose of erecting works for dealing with the Tar produced at these stations.
The Committee will be glad to receive communications from persons who may wish to tender.
EDWIN SMITH, Secretary.

SWANWICK CANNEL.

Illuminating power, 34 candles. Good Coke, 11½ cwt. to the ton.
For analysis, prices, and references, apply to
H. BOAM, Litchurch Villa, DERBY.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—

110 Mouthpieces, D-shape, 13 in. by 22 in., with Wrought-Iron Lids, Cross-Bars, Stand, Bridge, and Dip Pipes. Also about 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. 28 Mouthpieces, D-shape, 16 in. by 20 in., with Wrought-Iron Lids, Cross-Bars, Stand, Bridge, and Dip Pipes. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12 in. Slide-Valves and 12 in. Connections.

Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12 in. Connections.

Exhauster (Jones) to pass about 15,000 feet per hour.

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Two Vertical Steam-Engines, each about 6-horse power, with Pulleys, and Shafting used for driving the above.

Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.

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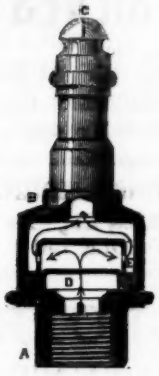

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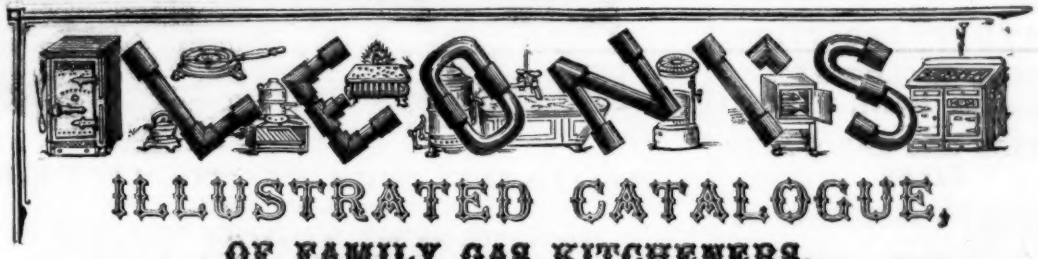

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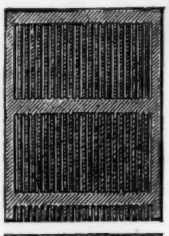

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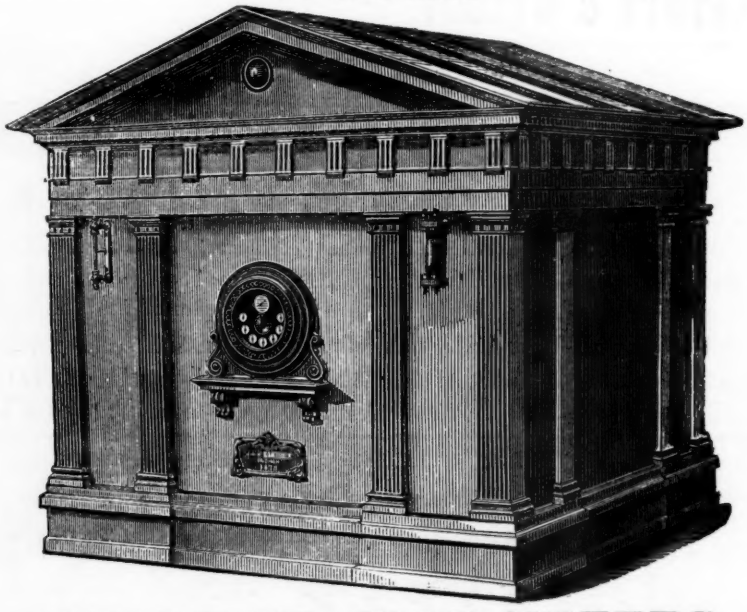

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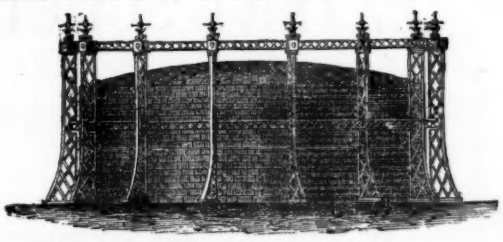

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It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

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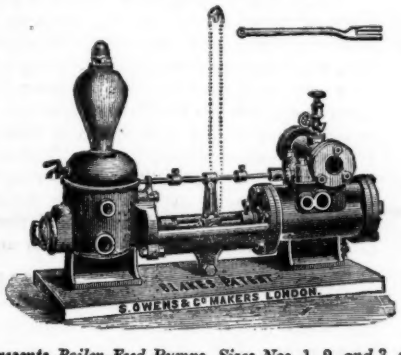

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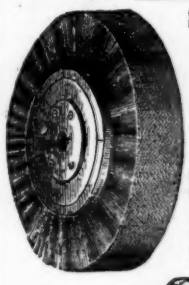

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Wheel,	6in.	dia.,	2¼	wide,	1½	wire projects,	5	rows, ¾ hole,	10s.
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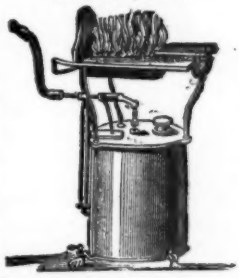
Are specially suited for General Outdoor Purposes, and will be found suitable to any climate.



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No. 1, 8 in. bellows, to heat 1 in. sq. in 2 min.	6 4
2, 10 in. bellows, to heat 1½ in. sq. in 2 min.	8 8
3, 12 in. bellows, to heat 2 in. sq. in 2 min.	12 8

DOUBLE BLAST.	£ s.
No. 4, 8 in. bellows, to heat 1 1-8th in. sq. in 2 min.	10 8
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6, 12 in. bellows, to heat 3 in. sq. in 2 min.	16 8
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The "Champion" Iron Encased Forge,

With Vice-Drilling Frame on stand complete.

No. 10, Double Blast, 10 in. bellows, to heat 2 in. sq. in 2 min., £15.
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Sole Agents for the Lightning Screwing and Drilling Machines, Helical Pulley Blocks, Automatic Revolving Scrapers, Earth Borers, Tanite Co.'s Emery Wheels and Emery Grinders, Lathes, Genuine Morse Twist Drills, Cushman's Drill and Lathe Chucks, Patent Belt Screws, Patent Safety Belt Shippers, Casting Brushes, Shaped Diamonds, and a great variety of other Machinery always kept in stock or in progress.

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MANN & WALKERS' PATENT SCRUBBER.

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It is to be particularly noted that the im- portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re- quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to MR. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

WILLIAM SUGG'S IMPROVED SYSTEM OF STREET LIGHTING.

Results obtained from WILLIAM SUGG'S large Argands for Street Lighting, by Mr. William King, Engineer to the Liverpool United Gas Company:—

ARGAND BURNER, WITH TWO CONCENTRIC FLAMES.

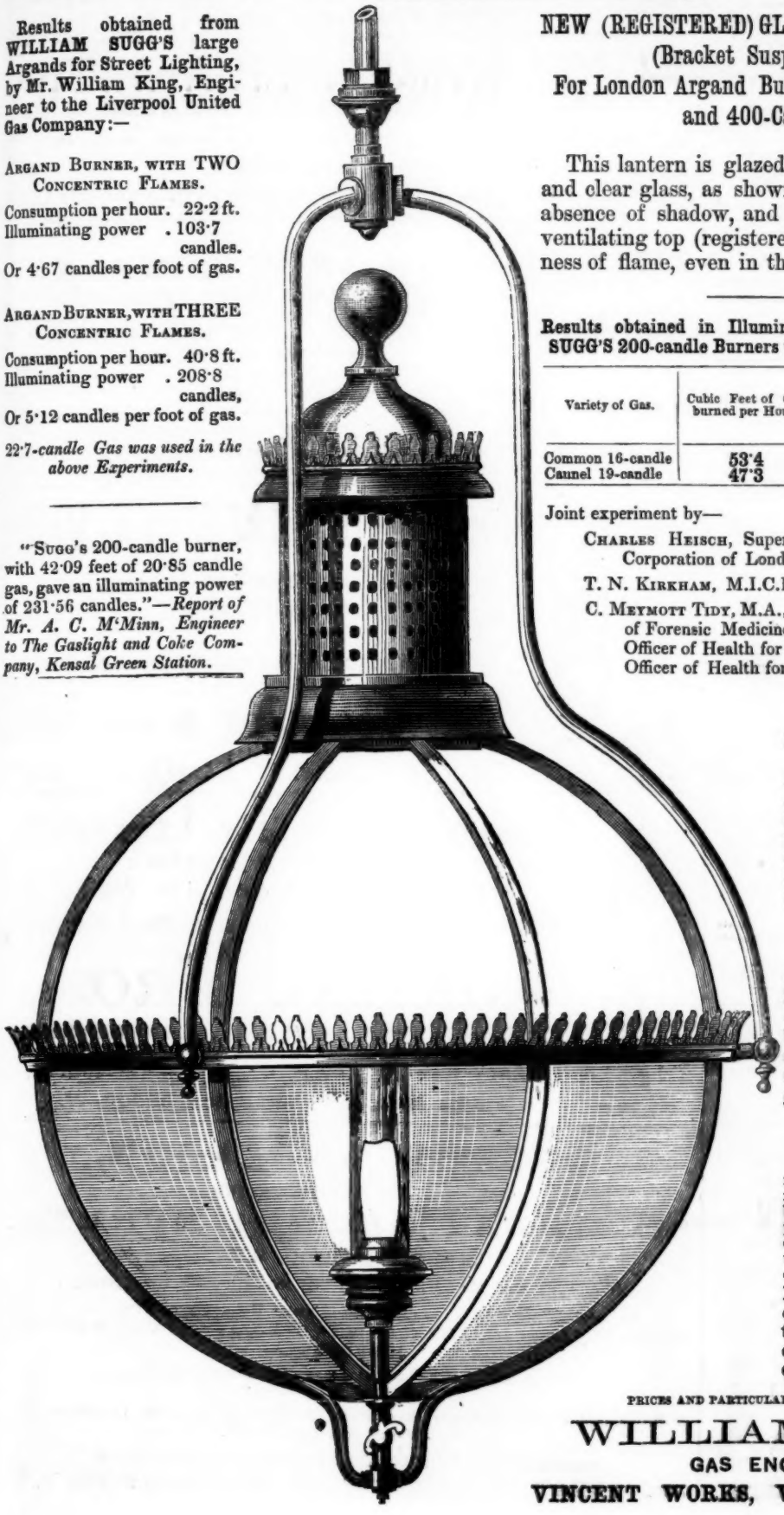
Consumption per hour. 22·2 ft.
Illuminating power . 103·7 candles.
Or 4·67 candles per foot of gas.

ARGAND BURNER, WITH THREE CONCENTRIC FLAMES.

Consumption per hour. 40·8 ft.
Illuminating power . 208·8 candles,
Or 5·12 candles per foot of gas.

22·7-candle Gas was used in the above Experiments.

"SUGG'S 200-candle burner, with 42·09 feet of 20·85 candle gas, gave an illuminating power of 231·56 candles."—*Report of Mr. A. C. M'Minn, Engineer to The Gaslight and Coke Company, Kensal Green Station.*



NEW (REGISTERED) GLOBE PATTERN LANTERN,
(Bracket Suspension Light,)
For London Argand Burners of 30, 50, 100, 200, and 400-Candle Power.

This lantern is glazed with opal reflecting panes and clear glass, as shown, thus securing an entire absence of shadow, and is fitted with the new self-ventilating top (registered), ensuring perfect steadiness of flame, even in the heaviest gale of wind.

Results obtained in Illuminating Power from WILLIAM SUGG'S 200-candle Burners with Cannel and Common Gas:—

Variety of Gas.	Cubic Feet of Gas burned per Hour.	Illuminating Power in Sperm Candles burning 120 Grains per Hour.	Number of Candles to which every Cubic Foot of Gas burned is equivalent.
Common 16-candle	53·4	228	4·25
Cannel 19-candle	47·3	252	4·76

Joint experiment by—

CHARLES HEISCH, Superintending Gas Examiner to the Corporation of London.

T. N. KIRKHAM, M.I.C.E., F.C.S.

C. MEYMOTT TIDY, M.A., M.B., Professor of Chemistry and of Forensic Medicine at the London Hospital, Medical Officer of Health for Islington, and late Deputy Medical Officer of Health for the City of London.

Mr. J. R. FRITH, Engineer of the Runcorn Gas-Works, Experimenting with a Sugg's Argand with three concentric rings, obtained an illuminating power of 220·5 candles, with a consumption of 45 cubic feet of 21-candle gas, or 4·9 candles per foot.

"The light exhibited last night (SUGG'S 200-candle burner and lantern) was equal to 360 candles—more than double that given by the old lamps, while the consumption of gas was exactly the same—40 feet per hour."—*Glasgow Herald*, April 25, 1879.

NOTICE.—Notwithstanding a number of statements which have been repeated in the public journals, that burners by other makers have surpassed these results, the reports of comparative experiments from which the above extracts have been copied conclusively prove that **the "Sugg" Burners give over 30 per cent. of Illuminating Power more than can be obtained from any other burners with the like quantity of gas.**

PRICES AND PARTICULARS ON APPLICATION TO

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GAS ENGINEER,
VINCENT WORKS, WESTMINSTER, S.W.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

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HARTHILL CANNEL

Yields 14,920 cubic feet of 40·92-candle gas per ton.

THRASHBUSH CANNEL

12,530 cubic feet of 40·22-candle gas per ton, and 9 cwts. of good coke.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash. This cannel is almost free from sulphur.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

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THE MIRFIELD COAL COMPANY are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 12,600 *cubic feet of* 16·67 *candle gas, with* 1430 *lbs. of good Coke, per ton.* Ash in Coke, 1·88.

Apply to the MIRFIELD COLLIERY, Mirfield, NORMANTON. London Agents: SMITH BROS., 38, THROGMORTON ST., E.C.

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This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

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Mr. James Paterson, C.E., F.G.S., in his analysis of T. V. Arley Coal, says: "Some parts merge into a semi-Cannel; Gas per ton, 10,300 cubic feet; illuminating power, 16·96 candles; coke of high quality, 1431 lbs. per ton."

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POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

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All negotiations respecting M. Brémond's patented process for preventing Deposits of

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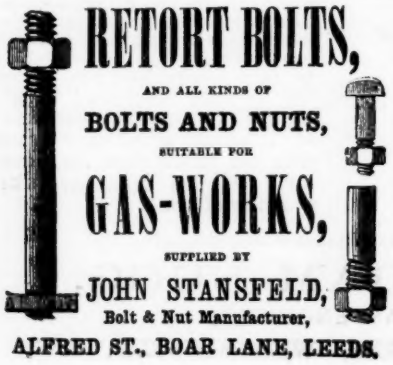

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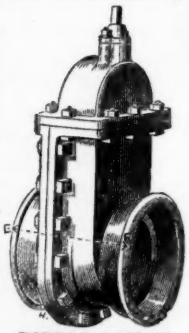

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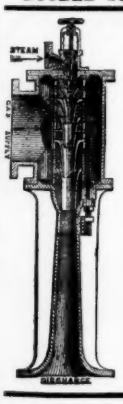

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The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

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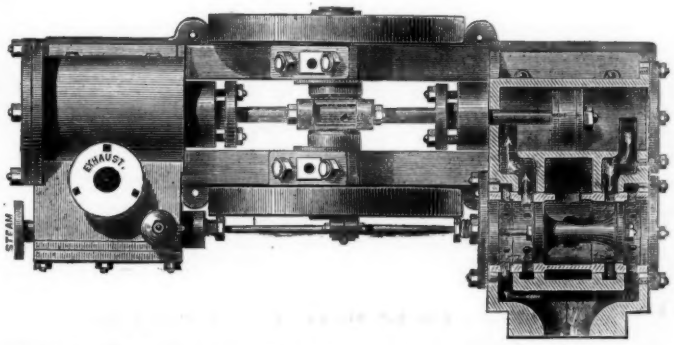

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The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

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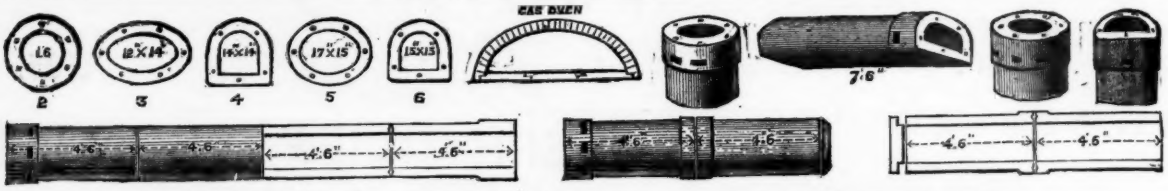

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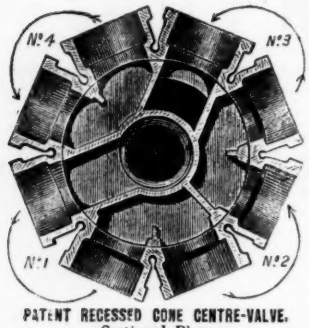

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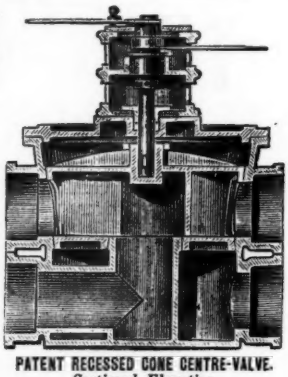

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